

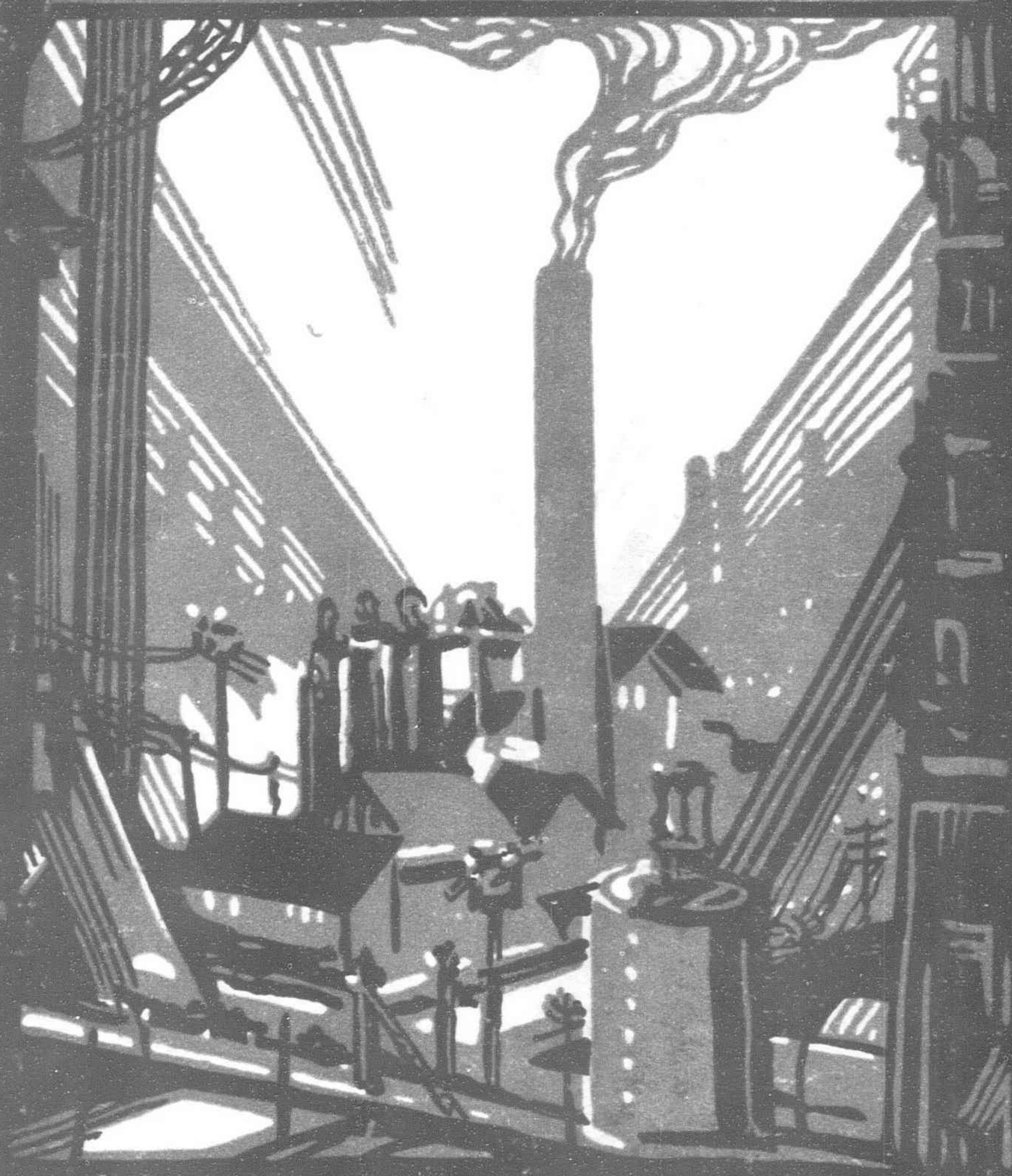
FINANCE

COMMERCE

ENGINEERING

THE FAR EASTERN REVIEW

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THE INDUSTRIAL COLOSSUS OF THE
NORTH

NEW FAR EASTERN DIPLOMACY

THE PERENNIAL CRISES OF JAPAN

Vol. XXXIV

JUNE, 1938

No. 6

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SHANGHAI, JUNE, 1938

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The Industrial Colossus of the North

Formation of the Manchuria Industrial Development Corporation is Unique Event

WHAT the United States Steel Corporation is to America, or what Vickers, Limited, is to the United Kingdom will be the newly organized Manchuria Industrial Development Corporation to the Empire of Manchoukuo and to Japan, if a ten-year program this great new enterprise has just launched is brought even partially to realization. The Manchuria Industrial Development Corporation may fairly be rated as the greatest industrial enterprise in the Far East and one of the greatest in the world. The purpose behind the huge enterprise is to harness and to make available the far-flung rich resources of Manchoukuo. As an essential preliminary, this great new semi-governmental corporation, which was brought into existence under the joint auspices of the Governments of Japan and Manchoukuo, already has acquired a major portion of the vast industrial holdings formerly owned and operated by the South Manchuria Railway. It controls also immense holdings in Japan proper that involve Y.900,000,000 authorized capital of which Y.700,000,000 is paid up.

In many particulars the formation of the Manchuria Industrial Development Corporation is a unique event in world industrial history. It involved a complete change in the national status of one of Japan's greatest industrial organizations, The Nippon Industrial Company, which operated eighteen huge subsidiary enterprises and 130 attendant projects commanding combined capital resources comparable to the industrial investments of the great houses of Mitusi and Mitsubishi. This great institution, now extinguished and transplanted with a changed and vastly enlarged identity into a new setting at Hsinking, Capital of Manchoukuo, has merged all its holdings with the interests of Manchoukuo in the newly formed corporation to exploit the resources of Manchoukuo. The founders of the new corporation, realizing the vastness of the task that lies ahead of them, which has been begun at a time so inauspicious with hostilities in progress in China, frankly hope to obtain co-operation from the outside world, for it is felt that to realize purposes in view, manpower, capital and technique will have to be summoned from all corners of the earth. Financial arrangements of a character calculated to attract this co-operation from the outside world and distinctly to make it "worth-while" to investors are being carried forward.

Record of Merger

Thus the Manchoukuo Government and the Nippon Industrial Company have merged interests and have joined forces in the Manchuria Industrial Development Corporation, which began its career on March 1 of this year. The corporation will control iron and steel, light metal, motor vehicles, aircraft and other heavy industries and will engage in mining activities, particularly gold mining. In an interesting and valuable compilation that the *Oriental Economist* issued regarding the Manchuria Industrial Development Corporation, the sequence of events that led to the formation of the corporation is given as follows:

October 29, 1937. Announcement was made to the press by the Japanese and Manchoukuo Governments, and by Mr. Yoshisuke Aikawa, President of the Nippon Industrial Company, Ltd., of the proposed change in the status of the Nippon Industrial Company, Ltd., and the formation of the semi-governmental Manchuria Industrial Development Corporation.

November 20, 1937. A General Meeting of shareholders of the Nippon Industrial Company, Ltd., passed unanimously a resolution for the removal of the Company's Head Office to the South Manchuria Railway Zone in Hsinking.

December 1, 1937. The treaty between Japan and Manchoukuo became effective under which Japan gave up extraterritorial rights in Manchoukuo and transferred to Manchoukuo the right to administer the South Manchuria Railway Zone. As a result, the nationality of the Nippon Industrial Company, Ltd., was changed from Japanese to Manchoukuo.

December 20, 1937. The Manchuria Industrial Development Corporation Administration Act was promulgated by the Manchoukuo Government.

December 27, 1937. A General Meeting of shareholders of the Nippon Industrial Company, Ltd., passed unanimously the necessary resolutions for changing the Company into the Manchuria Industrial Development Corporation.

All the directors and auditors of the Company resigned from office, and new directors and auditors were elected. The Manchoukuo Government appointed Mr. Yoshisuke Aikawa, President of the Manchuria Industrial Development Corporation, and Mr. Hyo Kwan Sei, Vice-President, and approved the election of the following directors and auditors. Directors: Mr. Keisuke Yamada, Mr. Genshichi Asahara, Mr. Shinji Okumura, Mr. Shoichi Sera, Mr. Shizuka Tanaka, and Mr. So Sei To; Auditors, Mr. Yasuhiko Saito, Mr. Keinosuke Yamada and General Kin Taku.

Tokyo Announcement

With the announcement of the birth of the new enterprise in Manchoukuo, the Manchoukuo Affairs Bureau of The Japanese Government issued the following statement:

"Supported by both the Japanese and Manchoukuo Governments, the proposed corporation will have an initial capital stock of Y.450,000,000, one-half to be contributed by the Manchoukuo Government and one-half by private interests which in fact will be the present shareholders of the Nippon Industrial Company. Under the direction of Mr. Yoshisuke Aikawa, the corporation will be required to control the iron and steel, light metal, motor vehicle, aircraft and other heavy industries, and incidentally to operate various mining activities including gold mining. It is planned to invite private capital in Japan and Manchoukuo as well as foreign countries to participate both in the corporation itself and in its subsidiaries.

"Recent investigation has established beyond all doubt that Manchoukuo contains abundant natural resources of many kinds, of which iron and coal deposits in the Tungpientao district are a prominent instance. It is truly opportune that these resources are to be developed according to an integrated and co-ordinated program by the proposed corporation which will be organized to act in the interests and on behalf of the State."

Details of Financing

A statement issued to the shareholders of the Nippon Industrial Company regarding financing outlines definite terms agreed upon to

protect these shareholders and to provide for investment of private capital in Manchoukuo. These terms are as follows:

- (1) At the disposal of profit for each period, the dividend shall be determined as follows:
 - (a) When the dividend rate for private shareholders is ten per cent or under, the dividend for the shares held by Manchoukuo shall be one-half thereof. For example, if the private shareholders receive a ten per cent dividend Manchoukuo shall receive a five per cent dividend.
 - (b) Any profit in excess of a dividend of ten per cent for private shareholders and five per cent for Manchoukuo shall be divided equally. For example, if private shareholders receive a 12 per cent dividend, Manchoukuo shall receive a seven per cent dividend.
- (2) In the event of liquidation of the Corporation, the residue shall be divided between the private shareholders and the Government shares in the ratio of two to one up to one and one-half of times the amount of the paid-in capital. Any excess over one and one-half times the paid-in capital shall be divided equally.
- (3) The Manchoukuo Government shall guarantee the principal and a consolidated net return of six per cent per annum on all funds expended by the Corporation in connection with carrying on enterprises in Manchoukuo for ten years from the formation of the Corporation. In the event the Corporation does not earn said six per cent per annum and it is necessary for the Manchoukuo Government to make up a deficit up to six per cent, the Government shall be reimbursed in subsequent periods out of any earnings in excess of six per cent.
- (4) No Manchoukuo tax shall be imposed on profit made by the Corporation from investments outside Manchoukuo. Dividends paid by the Corporation to shareholders residing outside of Manchoukuo shall not be taxed. In regard to the taxation of enterprises in Manchoukuo, the Manchoukuo Government shall take suitable steps so that the functions of integrated management of the Corporation will not be impaired in the event that a change in the taxation system should cause an additional burden to be placed on the Corporation in the future.
- (5) The Corporation shall not be restricted in fixing the dividend rate when a disposal of profits is made.
- (6) In regard to the marketability of the private shares of the Corporation, the Japanese and Manchoukuo Governments shall take suitable measures so that the existing negotiability shall not be impaired. In short, adequate protection in the form of guarantees and other privileges as listed above is to be given to the Corporation's enterprises carried on within Manchoukuo during their early stages. Therefore, even in the event that the Corporation undertakes large-scale projects for rapid development, it will be in a position to continue paying dividends on private shares at a rate unchanged from that of the Nippon Industrial Company, so long as there is no deterioration in the operating and earning conditions of the former enterprises of the Nippon Industrial Company.

The Dynamo of the Machine

It is to be recorded that this colossal undertaking which envisages the creation of not one but a half dozen urban centers, each with a population of upwards a half a million, the employment of millions of workers, and the expenditure of billions, is to a great degree the product of a single human intelligence—just one man's idea. The individual is that singular personality who through the past decade has risen meteor like in the Japanese industrial firmament and by many in Japan is regarded as the outstanding industrial genius of his time—Yoshisuke Aikawa. At the age of 59, after thirty years of spectacularly successful business life in Japan, cheerfully he is gearing the tempo of his activities to continue leadership with notable personages ten and twenty years his junior. His life story holds points of interest. As scion of a distinguished family in early life he attracted the notice of and held the favor of Marquis Kaoru Inouye, veteran statesman of the Meiji Restoration. After graduation from the College of Engineering of the Imperial University in Tokyo in 1903 the original traits that so frequently

characterized his later career were evidenced when he went to work at the Shibaura Engineering Works—as an ordinary workman. A little later he went to the United States and found work in a foundry, and in America he gained knowledge and experience that proved of great value on his return to Japan when he organized the Tobata Foundry Company, forerunner of the Kokusan Kogyo, which recently was absorbed by the Hitachi Engineering Works.

In view of present-day conditions with a world struggling through effects of years of business depression, and in view also of overseas suspicion of Japan, and widespread disapproval of Japanese action in the China hostilities, superficially any observer might conclude that any hope for financial support and co-operation from the Occident for such an enterprise as the Manchuria Industrial Development Corporation should be dismissed at once as futile and fantastic. Still perhaps Japan is not entirely without friends abroad. The clamor against her to a considerable degree comes from a proportion of a public prone to criticize out loud, actuated by self interest in many cases, exceedingly articulate, but possessing little actual power. And in the business life of all peoples sentiment plays exactly no part at all. Japan's financial record in the world's market is another factor. She pays on the due date, invariably. These are factors that should receive consideration when the needs of the new semi-governmental enterprise for Occidental financial and technical support are considered—these factors plus the personality of Aikawa whose past exploits disclose an uncanny ability to convert impossibilities into achievements.

Aikawa's Own Statement

What the Manchuria Industrial Development Corporation is, the events leading up to its formation and what its program is for the future is best explained by Mr. Aikawa himself in an article written for the *Oriental Economist*. Mr. Aikawa writes:

The seeds of the present project were sown about a year ago, in the early autumn of 1936, when at the invitation of the Hsinking authorities I made a tour in Manchoukuo to inspect all phases of the region's industrial opportunities. Some time later I was appointed a sort of adviser to the Kwantung Army, which subsequently asked my opinions and suggestions on various pertinent subjects from time to time. The seeds thus sown have now borne fruit. Under the guidance of the Army, Manchoukuo has been making a series of experiments to determine what course its industrial development should follow, and many test tubes have been broken in the process. The sum total of these experiments has been the conclusion that it would be advantageous to leave industrial affairs to the care of industrialists. At the same time, the discovery has been made that the Nippon Industrial Company possesses every requisite for undertaking such a mission successfully. This concern is an organization with huge capital owned by over 50,000 well scattered stockholders. It has a capacity for almost infinite expansion and its assets comprise a rich reservoir of personnel, technique and skill covering a wide range of activities, all of which have been built up by many years of effort. In concept and organization the Nippon Industrial Company was well fitted from the beginning to carry out large scale projects of national importance, which makes it peculiarly suited for undertaking Manchoukuo's industrial development. All these facts were recognized. From the standpoint of Nippon Industrial, it was felt that Manchoukuo offers a new field of activity and unrivalled opportunity for giving full scope to the firm's functions as a holding company thereby fulfilling its assigned mission. It was only natural that both parties should soon find a common basis for agreement. Then the North China Incident broke out and developed into full Japan-China hostilities which proved something of a drain on the nation's productivity. Consequently, the Five-Year Plan of Manchoukuo became inactive and as a result the union between Manchoukuo and the Nippon Industrial Company was speedily concluded. It is therefore proper to say that the present project was in the nature of a chance occurrence, a product of circumstances so to speak. Certainly it was not the result of contrivance or promotion by any particular man or group of men.

How it Happened

A single circumstance that made the project possible was so unusual that it can well be described by the old platitude "an opportunity that occurs but once in a thousand years." This

was the abolition by Japan of extraterritorial rights in Manchoukuo and the transfer of administrative rights in the South Manchuria Railway zone which became effective on December 1, 1937. No matter how zealously Manchoukuo may have wanted Nippon Industrial to undertake the project, and no matter how keenly the company may have desired to do so, ordinarily it would have been out of the question for Nippon Industrial to transfer itself to Manchoukuo and retain its status as a juridical person, because Manchoukuo is a foreign country.

The then-impending transfer of extraterritorial rights and administrative rights in the Railway zone offered the unique opportunity. If the Nippon Industrial Company was to transfer itself to the Railway Zone before midnight on December 1, the removal would take place under Japanese law. After midnight of that date, the transplanted company would automatically acquire and retain the status of a juridical person under Manchoukuo law. Once the decision to act had been taken, all parties concerned acted with resolution and dispatch. High officials extended every co-operation, which was an outstanding factor in the success of the plan, and the transfer was completed within the time limit. Something that had appeared as improbable was thus accomplished. It might be proper to say, therefore, that the semi-governmental corporation of Manchoukuo now scheduled to be organized was something ordained by fate.

Formula For Exploring Manchoukuo

There are two avenues of approach to the double problem of exploring the natural resources and establishing industries in such a country as Manchoukuo. One is to take up individual industries one by one for separate treatment. This is a lineal system. The other is to integrate and co-ordinate the basic key industries according to a predetermined plan. This is an *ensemble* system. Personnel and management policy must differ according to which system is adopted.

In Manchoukuo as in most other places the lineal system has been in use up to now, and the iron, coal, aircraft and automobile industries, for example, have been established haphazardly and without the maintenance of an organic relationship among them. If we were to apply this system it would give Manchoukuo the status of a mere branch shop with Japan as the center of the industries concerned, and first-class men would not go to Manchoukuo. Furthermore the industries there would have to be operated on much the same scale as in Japan, and that scale would prove entirely too small for such a vast country. If business were conducted on this limited basis, it is natural that the amount of Japanese capital attracted there should be appreciably smaller than for a business having its headquarters in Japan. In fact, it is not surprising that industrial development in Manchoukuo thus far has moved at a snail's pace.

It is my opinion that for Manchoukuo the lineal method must be discarded and that the vast natural resources must be developed on a scale commensurate with the huge size and character of the country. The Japanese insular notion, which is based on past experience alone, will not be suitable in this instance. In the political, economic and all other fields, Manchoukuo must have its own program based on its special needs and characteristics.

Similarity With America

There is a striking similarity in many respects between Manchoukuo and America, especially such sections of America as Minnesota and Illinois. An aerial observation is sufficient to convince anyone of the topographical likeness. Both regions are rich in natural resources such as mining and agricultural possibilities, which in America have made possible the development of industrial metropolises like Detroit and Chicago. Climatic conditions also are similar, but in this respect Hsinking has an advantage over Detroit. In Detroit, heavy snowfall makes road conditions so bad that motor transport becomes extremely difficult in winter, whereas heavy snowfall is almost unknown in Manchoukuo and even north of Hsinking traffic can be carried on everywhere when the whole territory is turned into a wide expanse of frozen plains. The admirable development that has taken place around the Great Lakes encourages me to believe that a similar development in Manchoukuo would be comparatively much easier.

Thus the general lay of the land in Manchoukuo is such that small scale operations will be of no avail and should not be attempted. Industrial development must be carried out according to a definite plan specially framed for that country, and separate and apart from anything that has been done in Japan. The problem should be tackled in the pioneer spirit, for otherwise wonderful resources and opportunities will be wasted to no purpose. Many projects in Manchoukuo have been inaugurated as if branch shops of industries in Japan were being set up. This procedure is certain to fail as Manchoukuo's human as well as natural resources differ from those of Japan. Planned economy of the Russian pattern, in which natural resources rather than the population are the main factor of development, should be the objective. Everything must be done according to a predetermined program that has been drawn up with an eye to the distant future, in order to make the entire system of industries thus developed a well balanced, organic whole in usefulness and efficiency. From this standpoint I admire the plan on which Hsinking is being made a metropolis. Compared with those of Japan, Manchoukuo's natural resources are so immense that they require different methods of tapping. If precedent must be found we should look to America. When Manchoukuo is regarded in this light, many methods of solution suggest themselves.

This in short is my view of Manchoukuo. Different formulae must be followed in sinking capital and in employing manpower. The piece-meal manner of acquiring desirable men from Japan which has been followed in the past is wrong and not conducive to success. The immense natural resources of Manchoukuo call for a determined attack, made with strategy and on an ambitious scale. The labor available is of such a kind that quick results from highly skilled men are out of the question. A mass production system on a large scale, operated on a well organized plan similar to military drill methods, is most suitable because labor with a low standard of efficiency can then be utilized.

The Question of Markets

Markets are a necessary adjunct to the industrial development under discussion, but they will take care of themselves in time and can be deferred for later solution. In gunnery there are two methods of finding the range. One is to train your gun on a point beyond the target, then shorten your fire until you hit the mark. The other is to aim at a point in front of the target and then lengthen your fire. Both methods are acceptable in gunnery, but in developing Manchoukuo's industries we should aim beyond the target. When Tokyo Station was built, many people wondered why such a big structure should be erected in the middle of the virtual desert that Marunouchi then was, but what is the situation to-day? If you are niggardly with your ammunition and are unwilling to shoot beyond the mark, you can never accomplish anything worth while in Manchoukuo, for before long the target itself should be moving out toward the point of over-range fire. The industrial program should be conceived on a very ambitious scale, because the chances are that even so, complaints will soon be made that the scale is not large enough.

My opinion is that this principle is applicable to aircraft and automobile manufacture as well as other industries. The progress of any planned economy should be measured in time units of five or ten years, for during the life of the plan conditions are certain to change and it is quite likely that the original program will be found entirely inadequate for later requirements. The target is far distant and is moving fast. It is impossible for you to shoot far enough ahead. This is my view of the market problem, which can be left for solution later.

My conception of how Manchoukuo's industrial development should be effected is, in rough outline, as follows. Every action should be premeditated and all actions should be co-ordinated, as previously stated. The Ford system of supplying materials and parts should be considered in the manufacture of motor-cars, since obviously this manufacturing industry cannot be carried on successfully if the essential materials are beyond the manufacturers' control. An accurate program for the supply of necessary materials will have to be mapped out and capital requirements must be measured accordingly. A keynote of balance and harmony must be struck for the entire scheme of development. To mine coal, manufacture iron and assemble aircraft, each haphazardly and independent of the others, would clearly be uneconomic. All

activities must be interrelated and co-ordinated, and therefore we must have a central organization whose guiding principle will underlie all these activities that are to be brought under a single control and which will emphasize the unity of the whole mechanism. Any organization whose head is constantly changing would be incapable of undertaking the task. In the light of these requirements, the Nippon Industrial Company possesses unrivalled experience at least in Japan and therefore every qualification for this assignment.

To operate successfully in such a country as Manchoukuo, a business concern must also be democratic and must have at its disposal many men skilled in many branches of industries. Consequently a company which specializes in only one branch would not be qualified. The old established plutocrats are supplied with ample capital and equipped with a high-standard personnel for many industries but they cannot afford to move their headquarters to a foreign country and they face the added handicap of being unable to appeal to the public for capital, if necessary, because they are private concerns. With a holding company whose stock is held by the masses the case is entirely different as the stockholders are constantly changing and the potential supply of capital remains inexhaustible. As long as the enterprise is profitable and rests on a sound foundation, a holding company can raise new capital at any time it is required merely by operating the pump. This will be a feature of inestimable value in developing Manchoukuo's resources. In the light of these facts, the Nippon Industrial Company alone of all companies in Japan is qualified to fulfil Manchoukuo's requirements. Manchoukuo has what Nippon Industrial wants and Nippon Industrial has what Manchoukuo needs, and so it is in the logic of things that they should come together. The two were fated to unite.

Guaranteed Investment Returns

It may not be out of place to give an explanation here of the guarantee of six per cent per annum return on invested funds that was agreed to by the Manchoukuo Government. The fundamental question involved is whether sufficient returns will be realized to average six per cent per year for a period of ten years on all the funds brought into Manchoukuo. If an average six per cent return cannot be realized, then the project would have been better left alone. As Manchoukuo has taken the initiative and invites my participation, it is only reasonable that it should give the guarantee that these funds will earn six per cent. In fact, the resources available cannot have such a small value, and if this is the case the Government need not begrudge the guarantee.

The guarantee would not be needed if the undertaking were to be handled as heretofore in the piecemeal fashion suitable to ordinary business management. But in this particular instance, a semi-governmental corporation is going to be organized for the special purpose of building up any and all enterprises which Manchoukuo may deem necessary for its well-being. In other words, the new corporation is a sort of state institution and has to abide by the dictates of Manchoukuo, on whose behalf and interests the corporation is to undertake the work. As the primary purpose of such a task is fulfilling national requirements, anyone undertaking it is entitled to ask a proper guarantee. No one can afford to undertake such a gigantic work unconditionally. In the case of the South Manchuria Railway Company, I feel it illogical for the Company to make disbursements essential to the national existence without a guarantee. In carrying out a State policy the State must be consulted, and it is reasonable that there should be guarantees and safeguards that cannot be expected by an ordinary trading concern. About the capital needs involved, it is not right to apply to ordinary commercial banks without careful regard for the condition of the money market. If such a big credit seeker as the South Manchuria Railway were to dominate a tight loan market, the lot of small borrowers would be very unenviable, and the situation would become still worse if another loan seeker, the Manchuria Industrial Development Corporation, were to squeeze in a limited money market. Mindful of this fact, our corporation takes the stand that it will wait until such time as the capital supply condition becomes easier as far as the ordinary money market is concerned.

Some of the proposed Manchoukuo enterprises are clearly very profitable while others are distinctly unprofitable, but we will be satisfied if the consolidated earnings average six per cent. This is the basic principle of the semi-governmental corporation,

Both the aircraft and automobile manufacturing enterprises, if conducted on the scale projected, certainly will not be profit-makers for some time, but within ten years the moving target will be entering an easy range, with the result that the capital invested should be earning six per cent or much more on the average. It can be expected that when this stage is reached, these enterprises will be earning sufficient to repay the government grant for the return. As compared with the money lender's computation of interest by the day or the joint-stock company's dividend distribution by the half-year fiscal term, a ten year unit period for the settlement of accounts for the State may be called rather too short and might well be half a century or a full century. This is the principle underlying the guarantee of a return on the corporation's invested capital. The natural resources now lying dormant in Manchoukuo are, so to speak, first assessed and evaluated, then made the basis of a provisional dividend distribution which is subject to an eventual readjustment. Of course no guarantee of any kind is sought for the dividends to be paid for the old enterprises of the Nippon Industrial Company. The guarantee now being offered by Manchoukuo differs in character from those very often made for dividend privileges by ordinary semi-governmental companies in Japan. Ours is based on unquestionably sound logic and sound principles.

Broad Agreement Allows Free Hand

In this connection, it should be added that for the first ten years from the organization of the semi-governmental corporation, Manchoukuo guarantees not only a six per cent return but also the principal of all the funds brought into the country and employed for the operation of its enterprises. This guarantee applies to any money expended in Manchoukuo, i.e. capital investments, running expenses, and in fact, anything and everything in the holding company's disbursements for that purpose. The stand is taken that the semi-governmental corporation in question is, so to speak, a real estate agent whose salary should be considered as an investment needed for the exploration of natural resources. As the six per cent return means a net return after allowing for expenditures, the privilege is accorded to both capital and overhead expense items without discrimination. The calculation will be made not on the principle of the double-entry system of book-keeping, but on that of the single-entry.

Such a broad arrangement is in keeping with conditions in Manchoukuo, as the corporation needs considerable freedom for its operations. Unlike the so-called free enterprise of Japan, the corporation should have a broader arrangement as its undertaking is carried on under a definite premeditated scheme. Too much advantage, must not be taken of this guarantee, however. The scheme should be pushed boldly, but with every attention to small details. The business should be carried on in a fair and square manner.

Enterprises Controlled

Below are listed the principal affiliated companies that have been brought under control of the newly formed Corporation:

MANCHURIA INDUSTRIAL DEVELOPMENT CORPORATION

Capital Subscribed	..	..	Y.450,000,000
Capital Paid-up	..	..	Y.396,750,000

Principal Affiliated Companies

In Japan

NIPPON MINING CO., LTD.

Capital Subscribed	..	..	Y.160,000,000
Capital Paid-up	..	..	Y.138,750,000

Main Products : Gold, Silver, Copper, Crude Oil, Iron Ore, etc.

HITACHI, LTD.

Capital Subscribed	..	..	Y.117,900,000
Capital Paid-up	..	..	Y.103,162,500

Main Products : Electrical and Mechanical Equipments for Power Plants, Machineries and Rolling Stock, etc.

OSAKA IRON WORKS, LTD.

Capital Subscribed	.. ..	Y.12,000,000
Capital Paid-up	.. ..	Y.12,000,000
Main Lines : Shipbuilding, Ship Repairing, and General Engineering.		

HITACHI ELECTRIC POWER Co., LTD.

Capital Subscribed	.. ..	Y.10,000,000
Capital Paid-up	.. ..	Y. 6,250,000
Main Lines : Supply of electric power.		

NISSAN AUTOMOBILE Co., LTD.

Capital Subscribed	.. ..	Y.10,000,000
Capital Paid-up	.. ..	Y.10,000,000
Main Products : "Nissan" and "Datsun" Passenger Cars and Trucks.		

NISSAN AUTOMOBILE SALES Co., LTD.

Capital Subscribed	.. ..	Y.5,000,000
Capital Paid-up	.. ..	Y.2,000,000
Main Lines : Sales of "Nissan" and "Datsun" Cars and Trucks.		

NISSAN CHEMICAL INDUSTRY Co., LTD.

Capital Subscribed	.. ..	Y.124,000,000
Capital Paid-up	.. ..	Y. 77,500,000
Main Products : Coal, Fertilizers, etc.		

JAPAN FAT AND OIL INDUSTRY Co., LTD.

Capital Subscribed	.. ..	Y.40,500,000
Capital Paid-up	.. ..	Y.25,500,000
Main Products : Fish Oil and Fish Meals, Soaps, Paints, etc.		

NIPPON MARINE PRODUCTS Co., LTD.

Capital Subscribed	.. ..	Y.91,500,000
Capital Paid-up	.. ..	Y.67,000,000
Main Lines : Trawling, Floating Crab Canneries, Whale Catching and Whale Floating Factories, Ice Manufacturing and Cold Storage.		

NIPPON INDUSTRIAL RUBBER Co., LTD.

Capital Subscribed	.. ..	Y.10,000,000
Capital Paid-up	.. ..	Y.10,000,000
Main Lines : Rubber Plantation in British North Borneo, Hemp Plantation, Lumber and Woodwork Business.		

NISSAN STEAMSHIP Co., LTD.

Capital Subscribed	.. ..	Y.8,000,000
Capital Paid-up	.. ..	Y.6,125,000
Main Lines : Ocean Transportation.		

THE DAIDO MATCH Co., LTD.

Capital Subscribed	.. ..	Y.8,000,000
Capital Paid-up	.. ..	Y.7,000,000
Main Products : Matches.		

THE NISSAN FIRE AND MARINE INSURANCE Co., LTD.

Capital Subscribed	.. ..	Y.5,000,000
Capital Paid-up	.. ..	Y.1,250,000
Main Lines : Fire, Marine, Accident and Transportation Insurance.		

HONKEIKO COLLIERY AND IRON WORKS, LTD.

Capital Subscribed	.. ..	Y.10,000,000
Capital Paid-up	.. ..	Y.10,000,000
Main Products : Pig Iron and Steel.		

MANCHURIA MINING Co., LTD.

Capital Subscribed	.. ..	Y.50,000,000
Capital Paid-up	.. ..	Y.12,500,000
Main Products : Gold and Other Metals.		

MANCHURIA LIGHT METALS Co., LTD.

Capital Subscribed	.. ..	Y.25,000,000
Capital Paid-up	.. ..	Y. 6,250,000
Main Products : Aluminium and Alumina.		

DOWA AUTOMOBILE Co., LTD.

Capital Subscribed	.. ..	Y.6,200,000
Capital Paid-up	.. ..	Y.3,200,000
Main Products : Passenger Cars and Trucks.		

MANCHURIA GOLD MINING Co., LTD.

Capital Subscribed	.. ..	Y.12,000,000
Capital Paid-up	.. ..	Y.12,000,000
Main Lines : Gold Dredging.		

MANCHURIA LEAD Co., LTD.

Capital Subscribed	.. ..	Y.4,000,000
Capital Paid-up	.. ..	Y.4,000,000
Main Products : Lead and Zinc.		

THE MANCHURIA SOYA BEAN INDUSTRY CORP.

Capital Subscribed	.. ..	Y.5,000,000
Capital Paid-up	.. ..	Y.2,525,000
Main Products : Soya Bean Flour and Oil.		

Text of Manchoukuo Law

Below is given the text of the Manchoukuo Administration Act under which the Manchuria Industrial Development Corporation was brought into existence :

Imperial Ordinance No. 460, issued on December 20 of the 4th year of Kangte.

This is to sanction the Manchuria Industrial Development Corporation Administration Act and to order the same to be promulgated with approval of the Privy Council in accordance with Article 36 of the Constitution.

Signed and sealed by the Emperor of Manchoukuo.
December 20 of the 4th year of Kangte.

Chang Ching Hui
Prime-Minister of State
Lu Jung Huan
Minister of the Industrial Department
Han Yuan Chieh
Minister of the Economic Department
Chang Huan Hsiang
Minister of the Judicial Department

Imperial Ordinance No. 460.

MANCHURIA INDUSTRIAL DEVELOPMENT CORPORATION
ADMINISTRATION ACT

ARTICLE 1.—The Government shall supervise the Manchuria Industrial Development Corporation in accordance with this Law, in order to expedite the co-ordinated establishment of heavy industries in this country, and to control these industries.

ARTICLE 2.—The objects of the Manchuria Industrial Development Corporation are to invest in any or all of the following industries and to direct the management thereof in this country :

- (1) Iron and Steel Industry
- (2) Light Metal Industry
- (3) Automobile Manufacturing Industry
- (4) Aeroplane Manufacturing Industry
- (5) Coal Industry

In Manchoukuo

SHOWA STEEL WORKS, LTD.

Capital Subscribed	.. ..	Y.100,000,000
Capital Paid-up	.. ..	Y. 90,000,000
Main Products : Pig Iron and Steel Billets, Steel Products, etc.		

MANCHURIA COLLIERY Co., LTD.

Capital Subscribed	.. ..	Y.80,000,000
Capital Paid-up	.. ..	Y.32,000,000
Main Lines : Coal Mining.		

Besides the businesses mentioned in the preceding paragraph the Manchuria Industrial Development Corporation may incidentally invest in the business of mining gold, zinc, lead, copper and other metals or other enterprises. Provided, that the sanction of the Minister of the Competent Department shall be obtained for businesses other than investments in the mining business in this country.

ARTICLE 3.—The Manchuria Industrial Development Corporation shall establish its head office in Hsinking Special City.

ARTICLE 4.—The amount of capital of the Manchuria Industrial Development Corporation shall be Four Hundred Fifty Million Yen (Y.450,000,000). Provided, however, that the amount of capital may be increased with the sanction of the Minister of the Competent Department.

In the case contemplated in the proviso of the preceding paragraph, shares without voting power may be issued, irrespective of the provisions of the second paragraph of Article 97 of the Corporation Law.

ARTICLE 5.—The Government shall own one half of the total number of shares with voting power of the Manchuria Industrial Development Corporation.

ARTICLE 6.—Shares with voting power of the Manchuria Industrial Development Corporation may be transferred to persons of Manchoukuo and Japanese nationality only, or to juridical persons organized under the laws of either of these countries, the majority of the voting power of which juridical persons belongs to a person or persons or a juridical person or persons of Manchoukuo or Japanese nationality.

ARTICLE 7.—The Manchuria Industrial Development Corporation shall have one President, two Vice-Presidents, five or more Directors and three or more Auditors.

ARTICLE 8.—The President shall represent the Manchuria Industrial Development Corporation and superintend the business affairs thereof.

In case the President is prevented from performing his duties, one of the Vice-Presidents shall perform the duties of the President.

The Vice-Presidents and the Directors shall assist the President and shall manage the business affairs of the Manchuria Industrial Development Corporation.

The Auditors shall audit the business affairs of the Manchuria Industrial Development Corporation.

ARTICLE 9.—The President and Vice-Presidents shall be appointed by the Government, and Directors and Auditors shall be elected at General Meetings of Shareholders.

The term of office of the President and of Vice-Presidents shall be five years, the term of office of Directors shall be four years, and of Auditors three years.

ARTICLE 10.—The amount of remuneration and allowance to the President and Vice-Presidents shall be decided by the Government.

ARTICLE 11.—The President, Vice-Presidents and Directors attending to the ordinary business affairs shall not engage in other business without the permission of the Minister of the Competent Department.

ARTICLE 12.—The amount of dividend payable to shareholders at the close of each fiscal term of the Manchuria Industrial Development Corporation not in excess of seven and one half (7½) per cent per annum on the paid-in capital, shall be distributed in the proportion of one part to the shares owned by the Government and two parts to the shares owned by others than the Government.

In case the amount of dividend payable to shareholders exceeds seven and one half (7½) per cent per annum on the paid-in capital, the rate of dividend for such excess shall be equal as to each share.

In case the capital is increased in accordance with the provisions of Article 4, a special provision shall be made, with the sanction of the Minister of the Competent Department, as to the dividend payable to shareholders, irrespective of the provisions of the two preceding paragraphs.

ARTICLE 13.—If at the close of each fiscal term of the Manchuria Industrial Development Corporation, the consolidated net profits accrued from undertakings carried on in Manchoukuo do not equal six (6) per cent per annum on the total amount of funds appropriated for such undertakings (funds consisting of profits earned from such undertakings excepted), the Government will

contribute an amount equal to the amount of such shortage for any fiscal term ending within ten years from the enforcement date of this Law. If and when consolidated net profits for subsequent fiscal terms exceed six (6) per cent per annum, the amount so contributed shall be repaid from such excess, with interest at the rate of two (2) per cent per annum.

Consolidated net profits shall be calculated by deducting gross losses (interest on debts excluded) from gross profits (profit brought forward included) accrued from undertakings carried on in Manchoukuo.

ARTICLE 14.—In case of dissolution of the Manchuria Industrial Development Corporation the residual assets, the value of which do not exceed one hundred fifty (150) per cent of the paid-in capital, shall be distributed in the proportion of one part to the shares owned by the Government and two parts to the shares owned by others than the Government.

In case the value of the residual assets exceed one hundred fifty (150) per cent of the paid-in capital, the rate of distribution for such excess shall be equal as to each share.

In case the capital is increased in accordance with the provisions of Article 4, a special provision shall be made, with the sanction of the Minister of the Competent Department, as to the distribution of the residual assets to shareholders, irrespective of the provisions of the two preceding paragraphs.

ARTICLE 15.—The Manchuria Industrial Development Corporation may issue debentures to the extent of twice the amount of the paid-in capital with the sanction of the Minister of the Competent Department.

ARTICLE 16.—In calling general meetings of shareholders of the Manchuria Industrial Development Corporation, a notice shall be sent to each shareholder ten days prior to the date of the meeting.

ARTICLE 17.—The Manchuria Industrial Development Corporation shall determine its business plans for each fiscal year, and submit the plans to the Minister of the Competent Department. This rule shall apply to any alterations in the plans.

ARTICLE 18.—Resolutions for the election and dismissal of Directors and Auditors, for amendments to the Articles of Association, for the disposition of profits, for the issuance of debentures, for the amalgamation and dissolution of the Corporation shall not become effective unless the sanction of the Minister of the Competent Department is obtained therefor.

ARTICLE 19.—The Manchuria Industrial Development Corporation shall not transfer its important assets or surrender the same as security without the sanction of the Minister of the Competent Department.

ARTICLE 20.—The Minister of the Competent Department may issue the necessary orders for supervision of the business affairs of the Manchuria Industrial Development Corporation.

ARTICLE 21.—The Minister of the Competent Department may issue the necessary orders for control of the enterprises as to the business of the Manchuria Development Corporation.

ARTICLE 22.—The Minister of the Competent Department may rescind resolutions of the Manchuria Industrial Development Corporation, if he deems such resolutions to be against the laws, regulations, Articles of Association, or to be detrimental to public welfare.

The Minister of the Competent Department may dismiss the President, Vice-Presidents, Directors or Inspectors, if he deems acts of such officers to be against the laws, regulations, Articles of Association, orders issued hereunder, or to be detrimental to public welfare.

ARTICLE 23.—The Minister of the Competent Department shall appoint Superintendents of the Manchuria Industrial Development Corporation, and have such Superintendent inspect the business affairs of the Manchuria Industrial Development Corporation.

ARTICLE 24.—The Superintendent of the Manchuria Industrial Development Corporation may at any time examine safes, books and documents of the Manchuria Industrial Development Corporation.

The Superintendent of the Manchuria Industrial Development Corporation may at any time he deems it necessary order the Manchuria Industrial Development Corporation to submit its accounts and a report on the condition of its business.

(Continued on page 211)

New Far Eastern Diplomacy*

By HOTSUMI OZAKI

THE various changes which have occurred in the Far East since 1931 were indications of an approaching typhoon. That area now finds itself in the center of the maelstrom following the outbreak last summer of the present Sino-Japanese hostilities. The question as to when and in what manner this disturbance will cease is one in which the world must be gravely concerned. While it is impossible at this juncture to make any definite forecasts, it may safely be predicted that, in view of the extensive destruction wrought by the war and the circumstances arising therefrom the changes which will hereafter take place will be decisive and of historical importance.

The present situation in China is of such complexity and importance as it would have been well-nigh impossible to predict a few months ago. It is not difficult now, perhaps, to analyse the objective circumstances and deduce from them the inevitability of such a startling development. In fact, there were a few men of intelligence who, at the time of its outbreak, pointed out the likelihood of an extensive development of the Sino-Japanese Affair. But it seems that our political leaders, not to mention the masses of the people, had no clear anticipation of such a widespread development as has actually occurred. This is clear from the fact that the Japanese authorities at first treated the present affair as the "North China Incident," afterwards terming it the "China Affair," as well as from the fact that they had no program regarding the establishment of a new régime in North China and the subsequent foundation of another in Central China.

No one entertains any doubt that at the beginning of the affair, the Japanese Government were of the opinion that the Chinese Government would recognize the gravity of the situation and take steps towards the restoration of peace by reconsidering their policy toward Japan. The actual development, however, was such that the Japanese Government have had to adopt the drastic attitude of declining to deal with the Kuomintang Government. The reasons for this were doubtless inherent in the whole Far Eastern situation. In any case, it is clear that both China herself and the third Powers harbored a similar illusion as to the possible development of the affair. Candidly, the Powers either misjudged the serious endeavors of the Japanese authorities to prevent the general spread of the affair and took them as indicating a lack of confidence on the part of Japan in her ability to carry on a war, or else they overestimated the difficulties inherent in her position. At the same time, they formed a misleading estimate of the degree of success which had been attained in the unification of China and the development of her national strength; and so miscalculating the relative strength of China and Japan, they took no pains to adopt prompt and effective measures to prevent any aggravation of the situation.

Many young Chinese, however, indignantly take exception to such views and, enlarging on the history of Sino-Japanese relations since the Manchurian Incident, protest that, regardless of the possibility of victory or defeat, China could not but carry on a desperate resistance against Japan. This may have been true in view of the intense anti-Japanese feeling entertained by the Chinese people. But the question is whether the Chinese Government were wise in having permitted such a feeling to develop unchecked.

A Continental Policy

The view that a "continental policy" is inherent in the development of Japanese capitalism during the past seventy years and that the present Sino-Japanese Affair is an inevitable outcome of that policy is, speaking generally, not altogether mistaken. And there may be some truth in the assertion that, despite the intention of the inner circles of the Japanese Government to put an end to hostilities, that aim could not be successfully achieved on account of various circumstances in Japan,

and that this was probably an essential factor in the conditions stated above. But the problem is one that cannot be decided merely by the intentions of Japan. The actual situation at present involves considerable interests belonging to various Powers all over the world, and the important changes which can reasonably be anticipated in the future can be dealt with only by careful consideration and earnest efforts on the part of the Powers. This fact is purposely mentioned here in view of the necessity that the Powers should make up their minds as soon as possible regarding the question. If the situation is left to take its own course, and the authorities not only of Japan but also of China and other Powers stand idly by, the problem of China will become so confused as to defy all imagination.

Japan and China are of course the protagonists in the China Affair. It is the professed ideal of Japan to settle the affair ultimately with the Chinese people; and she has been pursuing the policy of permitting no foreign interference for fear of further complications.

However, now that Japan has decided not to have anything whatever to do with the Kuomintang Government, she cannot logically expect to bring about a settlement of the affair with the Chinese people, unless she completely overthrows that government or causes its total disintegration. Some people assert that from time immemorial there has existed no other method but force which can subdue a different race, and that since the present affair has assumed the proportions of a general war between the peoples of Japan and China, Japan should pursue the policy of a long-term war and carry the hostilities into all parts of China, be they the mountain fastnesses of Yunnan, or the remote corners of Szechuen, Sikang, Sinkiang and Tibet.

We learn from history that in A.D. 1234 the Yuan Dynasty opened hostilities with the South Sung, which finally disappeared in 1279 when Lu Hsiu-tsai threw himself into the sea with the Emperor Ping on his back at Aishan (Sunwaihshien in the Province of Kwantung). It therefore took forty-five years for the Yuans completely to overthrow the South Sung. As another instance, the founder of the Ching Dynasty, Nurhachi, commenced an expedition against the Ming Dynasty in 1618, and only in 1662 did the Ming Dynasty finally perish when Wu San-kuei, a general of the Ching forces, killed the Emperor Kuei at Yunnan. In this case, also, it took about forty-five years for the vanquished dynasty finally to disappear from the map. Considering these precedents, one can estimate that it will take a long period of years for Japan to vanquish China in this war of peoples. Yet, in this age of extremely complicated and tense international relations, it is no doubt impossible for Japan and China to carry on such a prolonged war. Since there is no room for direct negotiations between Japan and China, some formula for a settlement aside from the continuation of military operations must be sought.

Blow to Powers

China has long been in the condition of a semi-colony of various other Powers, as Sun Yat-sen once declared. In recent years, the movement for the recovery of her sovereign rights has attained considerable results, but her aspirations with regard to economic autonomy have not been fulfilled. On the contrary, the economic interests of the Powers in China have become more complicated and deep-rooted than ever. The outbreak of the Sino-Japanese hostilities has therefore been a severe blow to the Powers, to whom a prolongation of the conflict must prove extremely embarrassing and painful.

Of these Powers, excluding Japan, Great Britain possesses the most considerable interests in China. Let us briefly see what these interests are and compare them with those of Japan.

*In Contemporary Japan.

TRADE WITH CHINA

EXPORTS

(In thousand yuan)

Year		Great Britain	Japan
1934	.. ..	124,647	126,886
1935	.. ..	98,232	139,593
1936	.. ..	110,497	153,577

IMPORTS

(In thousand yuan)

Year		Great Britain	Japan
1934	.. ..	49,806	81,232
1935	.. ..	49,463	82,059
1936	.. ..	64,884	102,367

British and Japanese Shares in China's Imports (per cent).

Year		Great Britain	Japan
1913	.. ..	17	21
1920	.. ..	16	30
1931	.. ..	8	25
1932	.. ..	11	14
1934	.. ..	12	12
1935	.. ..	10	15
1936	.. ..	12	16

The above tables show only the trade interests of the United Kingdom. If we take into account the figures for her Dominions and colonies, especially those of Hongkong, we find that the place held by the British Empire in the trade of China is predominant, even surpassing that of the United States.

As regards investments in China, Professor C. E. Remer in his *Foreign Investments in China* gives the following figures for Great Britain and Japan in industrial investments and loans:

		In Million U.S. Dollars	Percentage of total foreign investments
Great Britain	.. ..	1,189.2	36.7
Japan	.. ..	1,136.9	35.1

For the purpose of the above figures, Manchuria, in which are the greater part of Japan's investments, is considered as a part of China. It can thus be seen that in China proper the relative proportion of British investments is much greater.

Even since 1931, Great Britain has been more and more active in making investments in China, the principal of which were as follows: Loan for spinning machinery, £1,800,000; Loan for the Central Government Machinery Plant, \$3,100,000 (Chinese dollar); Railway repairs loan, £600,000; Shanghai Reconstruction loan, \$6,000,000 (American dollar); Loan for the Canton-Hankow and Hangchow-Wuhu Railways, \$60,000,000 (Chinese dollar); Sulphate of ammonium loan, \$7,000,000 (Chinese dollar); Coal loan, £2,000,000; Loan for the Shanghai-Hangchow-Ningpo Railway, £500,000; Loan for the Canton-Meih sien Railway, £3,000,000; Loan for the Pukow-Sinyang Railway, £4,000,000.

Moreover, it is common knowledge that Anglo-Chinese economic relations have become steadily closer since the British assistance in China's currency reform in November, 1935. Besides this intimate economic relationship with China, Great Britain enjoys a general influence which she has steadily implanted in China during the past century, an influence which remains a deep-seated element in her political rights and interests in that country.

Britain's Failure?

In the course of the Shanghai Incident of 1932, Great Britain played a leading rôle in mediating between Japan and China and, together with other Powers acting under her influence, she brought about the conclusion of the Agreement for Cessation of Hostilities. She must have been keenly conscious of how far-reaching would be the blows to be dealt to Shanghai by the present Sino-Japanese conflict. It was, therefore, generally expected that Great Britain, who holds major interests in Shanghai, would take some step in order to prevent the spread of hostilities in that area. Why then did she fail to take any such measures?

Although there is no question that Britain's inaction in this regard was fundamentally attributable to her knowledge of the

domestic circumstances of both Japan and China, which in both countries made for aggravation of the situation, as well as to her knowledge of the difficulty of acting as a mediator, we must also take into consideration the fact that, on account of the marked rivalry of interest between herself and Japan, Britain had to be prepared even to fight with Japan, if she wanted to act as an effective mediator. Another reason may have been her expectation that, in view of the world-wide sympathy with China, the time might arrive when various Powers would have recourse to intervention which would check Japan. There is some ground for this supposition. For instance, the Germans in China, being on friendly terms with the Chinese in economic relations, manifested their dissatisfaction with the Japanese military operations which marked the early stages of the China Affair. Frankly speaking, Great Britain observing that Japan was affected by circumstances calculated to prevent her from waging a war, may have underestimated her real military and economic strength.

However, it is not of course to be asserted that there have not been any proposals offered or good offices rendered by any of the Powers with a view to bringing about peace. Early in the course of the conflict there was a proposal to establish a neutral zone in Shanghai, and afterwards, immediately before the fall of Nanking, an attempt was made by Herr Trautmann, German Ambassador to China, to sound out the possibilities of peace negotiations between Japan and China. In the neutralization proposal, the initiative was taken by Britain, and there is reason to believe that the German Ambassador's attempt at peace-making also proceeded with the understanding of Britain. It may be presumed also that Sir Archibald Clark Kerr, the new British Ambassador to China, who assumed his duties in February, came prepared with some peace plan. When the writer had an interview with him, the Ambassador said that his mind was a blank with regard to peace efforts, but, according to the report of a special correspondent at Hongkong of the *Shanghai Evening Post*, he is said recently to have submitted a British plan for peace to Madame Chiang Kai-shek. The plan was understood to be as follows:

- (1) That autonomy be granted to Inner Mongolia by the Chinese Government.
- (2) That the North China provinces north of the Yellow River be governed by a special council employing Japanese advisers.
- (3) That Japan be given the right to station garrisons not only in areas north of the Yellow River, such as Peiping and Tientsin, but also in Shanghai, Nanking, Hankow and Canton.
- (4) That China pay an indemnity to the Japanese Government to the amount of \$200,000,000, which the Japanese Government will invest in China.

(*Shanghai Evening Post*, March 18, 1938).

Madame Chiang was reported to have replied that, although she could not agree to the proposed plan, she would transmit it to the government at Hankow, whither she went by aeroplane. Although the report is one of many rumors prevalent in Hongkong, it seems fairly credible in all the circumstances.

Certainly Anglo-Japanese relations constitute one of the keys to a solution of the immediate China problem. There exist between Japan and Great Britain a number of very difficult problems awaiting settlement. Some of the pivotal questions are those which are centred in Shanghai, among which is that of reorganizing the International Settlement. Moreover, there is a knotty problem with regard to the Chinese currency system. Secondly, there are problems regarding the possibility of Japanese thrusts at South China, the basic one being an attack on Canton (Editor's Note: Japan began her Canton attack May 29, 1938); and there is also the question of Japan's control of the sea and some apprehension of an occupation of the island of Hainan. All these are questions which obstruct an understanding and closer relationship between Japan and Great Britain. On the other hand, they might serve as a lever to bring the two countries into collaboration. Everything depends upon the manner of their solution.

Animosity in Shanghai

It is true that in Japan there was a section of opinion which maintained that foreign economic influence should be driven out of China. In the difficult military engagements around Shanghai,

it was felt that much of the Japanese embarrassments arose from the special status of the Settlement. Furthermore, there were doubtless some among the Japanese residents in Shanghai who, having long harbored animosity toward the British influence in the district, made hostile gestures against Great Britain. The progress of hostilities, however, has served to alleviate the excessively hard feelings, as the new situation as it developed in the districts occupied by the Japanese forces demanded some sort of security. These factors, together with the public feeling in Japan, have conduced to the demand for an understanding with the Powers. And it is believed that on the British side, too, there is growing recognition of the necessity of reconsideration on the basis of the realities of the situation.

In view of the fact that China is bound to have relations with capitalistic societies, the extent to which she is influenced by external events is enormous. To Great Britain and America, Chinese people generally show good will, but toward the Soviet Union they are not necessarily favorably disposed, and Chinese commercial circles in the treaty ports still continue to entertain instinctive misgivings concerning that country. But there is an increasing feeling of reliance on the Soviet Union among the intelligentsia, many of whom seem to think that if China is abandoned by the capitalistic Powers in the future, the only nation that will remain China's friend, whether desired or not, will be the Soviet Union. They apparently think that the present amount of Soviet's assistance to China in arms and otherwise is not enough. The conservative attitude of the Soviet Union is probably due to various international circumstances as it is obviously a reflection of the relations in China itself between the Kuomintang and the Communist Party. Any rapid increase in influence of the Communist Party would not only alarm the Kuomintang but would cause confusion among the masses of people who generally support the Kuomintang, and would moreover give cause for apprehension on the part of Great Britain and the other Powers which are supporting China.

We have seen in Shanghai, Hongkong and other places how keenly sensitive the helpless Chinese people are to their international environment. For example, when reports came to China that Herr Hitler had publicly expressed his intention of recognizing Manchoukuo and to support Japan, the editorial tone of the Chinese press was full of pessimism and even seemed too lacking in spirit to criticize Germany. How much China expected of the possibilities latent in the *Ladybird* and *Panay* incidents which occurred at the time of the occupation of Nanking is simply beyond our imagination.

As has been indicated above, the future development of the China Affair largely depends upon the course of international relations. But the most crucial point in the whole problem lies in what will be the internal conditions of China. Will China be able to carry on her so-called "long-term resistance" against Japan under such adverse conditions as those in which she is now plunged? In order to find an answer to the question we must take into consideration, firstly the question of the "people's united front" in China, secondly the question of China's financial ability for the continuation of the war, and thirdly the attitude of the various war-lords.

China's Wartime Finances

The question of China's wartime finance has many interesting aspects worth studying in their bearing on the characteristics of Chinese society. It seems at a glance a puzzling phenomenon that China is able to maintain the value of her currency in spite of the loss of her capital city and the destruction of her industries and foreign trade. Concerning this, an American well versed in Chinese economics offered the following explanation:

It is not right to think that the Chinese currency system is maintained largely by influences other than those of an economic character. The position of the Chinese currency is attributable to the fact that the Nanking Government took the decisive step at the proper moment of unifying the currency systems and has been maintaining in foreign markets a comparatively large amount of silver acquired with the new currency as a fund for the maintenance of exchange rates. At the opening of the hostilities there was about 800,000,000 yuan worth of silver in the British and American markets, of which there still remains from 500,000,000 to 600,000,000 yuan. Since China's military expenditure does not amount to more than 50,000,000 yuan a month, it will be some time before her funds are exhausted by the purchase of arms and ammunition.

Even accepting this analysis, there are elements in it which may make even Great Britain hesitate to continue her assistance to China in the event of China's economic foundations being endangered by defeat in war, or by internal disruption, or through some other circumstance. As for the possible attitude of the various war-lords, that of the Kwansi faction as well as that of the anti-Central Government Szechuen military chieftains merit careful attention.

But at the core of all these questions is the problem of the unification of the Chinese people. Although this is apt to be treated as a question of collaboration between the Kuomintang and the Communist Party, it is the writer's opinion that the problem involves far more significant factors. The relative positions of these two parties are differently estimated by different observers. At present the influence of the Communist Party does not seem so powerful as is generally reported. But whether this is due to a lack of real strength in that party or to its strategical self-restraint is not clear. The question of unifying the people is more fundamental than the question of collaboration between the Kuomintang and the Communist Party, and it has apparently made great strides toward realization on account of the present affair. There will probably appear in future various phases of disintegration in China, but it is doubtful whether the unification movement will ever totally disappear. This, together with the problem created by the serious economic destruction sustained by China in the present hostilities—a destruction spelling fifty years' retrogression of capitalism in China—will probably remain important questions challenging solution. The latter problem involves dire and conflicting possibilities of which China's complete conversion into a colony is one and the birth of a non-capitalistic China is another.

The Industrial Colossus of the North

(Continued from page 208)

The Superintendent of the Manchuria Industrial Development Corporation may attend general meetings of shareholders, and other meetings, and express his opinion thereat.

ARTICLE 25.—The Minister of the Competent Department referred to in this Law shall be the Minister of the Industrial Department and the Minister of the Economic Department.

ARTICLE 26.—No person other than the Manchuria Development Corporation may use the name of Manchuria Development Corporation, or any other name similar thereto, as a trade name.

SUPPLEMENTARY PROVISIONS

ARTICLE 27.—This Law shall be enforced on and after December 27 of the 4th year of Kangte.

ARTICLE 28.—The Capital of the Manchuria Industrial Development Corporation may for the time being be in Japanese currency.

ARTICLE 29.—As to the businesses coming under the second paragraph of Article 2, in which the Manchuria Industrial Develop-

ment Corporation may have invested at the time of the enforcement of this Law, such business or businesses as to which notice is given to the Minister of the Competent Department within thirty days from the date of enforcement hereof shall be deemed to have been sanctioned hereunder.

ARTICLE 30.—If the President, Vice-Presidents or Directors attending to ordinary business affairs of the Manchuria Industrial Development Corporation, who are engaged in other business at the time of enforcement of this Law, notify such fact to the Minister of the Competent Department within thirty days from the date of enforcement hereof, it shall be deemed that they have obtained sanction therefor.

ARTICLE 31.—The register of shareholders and the original record of debentures of the Manchuria Industrial Development Corporation, with the sanction of the Minister of the Competent Department, shall not be subject to the provisions of Article 123 of the Corporation Law for the time being.

The Perennial Crises of Japan

By T. SCOTT MIYAKAWA

New York Correspondent for the "Japan Times and Mail"

FOR over two centuries the Western peoples have dominated the Far East, great areas of which became either colonies or semi-colonies of the Occident. This unlimited power probably accounts for the unconscious arrogance and sense of superiority of many Western nations. As André Siegfried, the noted French commentator, has well observed:—

"Everywhere (all the world, including the Far East—TSM) they (the Western peoples) presumed to dictate the conditions under which developments could be undertaken. They regulated not only the movement of goods but also of men, whether it was a question of slaves, servile or semi-servile labor, or European emigrants wishing to settle in the countries of their choice We were astonished if we received the slightest resistance, in fact we considered it scandalous To-day . . . I am almost appalled. I may have been modest enough personally, but my pride at being a white man and a European was all the more extraordinary because it was unconscious. That my race and my continent should be accorded every privilege seemed quite natural"

Such being the atmosphere in which almost all Occidentals, including Americans, grow and live, it is not at all surprising that objectivity towards the Orient is rarely found, even though many may wish to be free of prejudices. Unfortunately, even those Westerners able to approach the problems of the Far East impartially encounter great difficulties in understanding the developments because they evaluate or feel that they must evaluate everything according to Western standards.

Satisfactory as this may be most of the time, it certainly does not apply to everything. Resorting to the safer realm of art which offers some illustrative parallels to political issues, we find outstanding American and European scholars like Sir George Sansome, Laurence Binyon, and Ralph Adams Cram making such statements selected at random as follows:—

"We may look at, and speak of, and think about the art of Japan, but we can never reduce it to a chronological list and a table of formulæ, as is our wont with the art of our own West.

" There is something between Europe and Asia besides a difference of tongues, and explicit comprehension does not follow the mastery of a grammar and a vocabulary. There is an utter antagonism of ideals and methods. Neither can you measure wine with a yardstick, nor *Yamato-damashi* by the Data of Ethics. One standard is inoperative in the case of the other In the matter of art, for example, all the tests of detail are different. Velasquez and Korin are diverse sides of a shield, either destructive of the other, it would seem at first"

"The Japanese and the American, thinking in terms of Nippon and of the United States, stare, uncomprehensive and mutually repellent, but when either is able to cast aside the convention race has wrought, understanding is possible, or if not understanding, then at least implicit acceptance."

"Art is a conventionalized imagination: now when this quality which is so largely the fruit of racial experience develops from an inherited tradition that has been changeless through generations unnumbered; when it grows from a system religious in its origin, now expanded until it envelops every form of physical, mental, and spiritual activity . . . why the task is arduous indeed.

"I do not mean to imply by what I have said above that it is impossible to judge it by western standards: in so far as these are universal and neither local nor special, Japanese art stands the test as well as that of our own race but each manifestation possesses numberless other qualities, many of them of almost equal value, but peculiar, intimate and

personal. These must be judged by other standards and it is here that I think we shall fail in our estimate"

Things Uniquely Japanese

Thus it is with Japanese politics and social organization. We may judge them by Western standards, but we must also realize that numberless social manifestations, even as in art, belong uniquely to Japanese life and contain qualities entirely overlooked by the West and incapable of being evaluated according to Western standards. It is here that so many Western observers begin to make mistakes. If this is well understood, a real start can be made in studying contemporary developments in Japan.

The Hayashi Government was the first of a series of bureaucratic-coalition Cabinets to have no members of the major political parties. Although it had a conciliatory career diplomat, Naotake Sato, as the Foreign Minister, and a capitalist against whom the Army extremists had been fighting, or more accurately a representative of the capitalists, Toyotaro Yuki, as the Finance Minister, the public regarded it as being too subservient to the Army militants. After coaxing the Diet into passing the budget, much to the surprise of all, a short time before the end of the session, Premier Hayashi secured permission to dissolve the Parliament. The legislators, therefore, automatically faced a general election.

Apparently, Premier Hayashi felt that the public would support him against those whom he deemed recalcitrant legislators who had obstructed a number of important bills and attempted to bargain for their passage with new election laws that many believed would perpetuate the unsatisfactory and corrupt election practices. The listless campaign proved that the voters had no interest. Only the labor and proletarian candidates drew any enthusiasm. The reason for this situation is not hard to find. Premier Hayashi was too cautious to satisfy the extremists in the Army, while his associations with the Army created doubts among the people. The voters had no intention of electing supporters of the unpopular Hayashi Government. At the same time, because of their previously poor record of ineptness and occasional corruption, the public had no confidence in the major political parties.

As the result, only sixty per cent of the electorate voted although the two major parties received overwhelming percentage of the actual votes cast, while the laborites, the Shakai Taishuto and their allies, increased their seats to thirty-seven. In spite of the returns, Prime Minister Hayashi announced that he would continue in office. This in a sense he could since the Cabinet owes its responsibility to the Emperor directly and not to the Diet. Moreover, he had not entered candidates pledged to support him. The major parties thereupon threatened to cast a vote of no-confidence at the first session. Consequently, the Government's position became so unsatisfactory that it resigned.

Parallel in the U.S.

Powerful conflicting groups rise and clash with one another in any rapidly developing country. Thus in the United States, by 1861 the differences of interest became so great that the Civil War broke out. Or to-day, as economic power slips away from the hitherto monopoly of the financial groups to a broader base, we see a certain lack of agreement, shall we say, between Mr. Lewis and his associates on the one hand and on the other Mr. Girdler and his colleagues. The strong surges of unrest and search for power among various groups such as the Army extremists, political parties, and the great financial interests that we see in Japan to-day can be understood in the light of the sudden transformation of that nation from an isolated, somewhat feudal culture to the status of a world power.

To form the new government, Japan turned to Prince Konoye, an aristocrat of ancient lineage and the President of the House of Peers with a reputation for political sagacity and aloofness from narrow factionalism. Naturally, he has the confidence of the people who see in him a leader with no conscious nor unconscious ulterior motives and able to work for the good of the country whole heartedly since he already has prestige, title, and security. Fortunately also, since he has surrounded himself with a personal "brain trust" composed of leading scholars and experts, he has had unusually broad understanding of the current problems.

Contrary to the views of some commentators, Prince Konoye does not believe in fascism. He is too well educated, too enlightened, to be a real fascist. True, he believes that the political administration of Japan must conform with the customs and heritage of the people in so far as they adequately meet the current issues. This probably means, among other developments, increasing state control over industry and finance while retaining private initiative, recognition of Parliamentary system even if not of party governments, greater attention to agriculture, and an attempt to co-ordinate the total resources of the country to meet the grave economic and demographic problems.

Obviously, his position is not enviable. First of all, he must reconcile the existing groups. To conciliate the political parties, the new Government contains a number of their leaders and has restored the positions of Parliamentary Vice Minister and Counsellor. To gain the support of the Army, he promised in part at least to back their budget demands and some of the industrial reforms. To allay the fears of the financial circles, he placed career men in both the Ministry of Finance and the Ministry of Commerce and Industry.

The Army appropriations for the past three years averaged over Y.467,000,000 (about \$132,000,000) and the total for both armed services about Y.943,000,000 (about \$270,000,000). This spring the War Minister announced a twelve year replenishment program. Why have the armed services insisted upon even greater allowances for the coming year in face of the set-back in the extremists' plan for the control of the government?

Reasons for Large Budget

Two main factors have prompted the insistence upon the record-breaking budget. First, for many years following the World War, the Japanese Army was undeniably backward in mechanization. All the reports by the American and European observers during the Post-War Era commented upon the great lag in the mechanization of the Japanese Army. As Kato and Hamaguchi Governments continued in power, military appropriations became relatively less and less and replenishment was deferred still further. The Army, in brief, wants to use much of the appropriations in improving its mobile equipment and modernizing its mechanical services.

Secondly, the world as a whole is having a mad armaments race. The armed services of Japan obviously feel that they must regulate their program according to those of other countries. Needless to say, the unprecedentedly-huge appropriations of the Soviet Union, Great Britain, and even the United States influenced the announcement of the twelve year replenishment plan.

The Army points to the two most gigantic immediate neighbors of Japan—China and the Soviet Union. Russia in particular has great strategic advantages over Japan. The Soviet Air Force could destroy Tokyo, Osaka, and Nagoya, the three main industrial and financial centers of Japan and paralyze the country, whereas the Japanese would have no means of retaliation, only the vast open spaces of Siberia. From the past, ever since the Czarist days of imperialism when Russia, as Czar's own Prime Minister Count Witte declared, provoked the Russo-Japanese War in an attempt to eliminate Japan, the Japanese have looked upon the Big Bear of the North with an obsessive fear. Naturally, when the Soviet giant absorbed vast Outer Mongolia with an area exceeding 1,360,000 square miles some time before the Manchurian Incident, extends its influence into Sinkiang, and builds up an Army to-day estimated as high as 1,600,000 men with 10,000,000 in reserves, with thousands of bombing planes and tanks, with incredibly huge budgets of Roubles 14,327,000,000 last year and Roubles 20,000,000,000 this year, the Japanese Army would demand that its arms be at least partially increased. Even so, it is true that Japan has a standing Army of less than one-fifth of that of the Soviet Union.

Now, several overwhelmingly gigantic problems perennially confront every Government and statesman of Japan, hence the title, "The Perennial Crises of Japan." First, let us consider the alarming crisis in population increase. Seventy-one million people of Japan Proper live in an area less than that of California. Each year the population increases over a million. The added numbers must find means of living. Because of the mountains, even with the terracing of the incredibly steep hillsides, only sixteen per cent of the country can be cultivated. Consequently, the population density of Japan is not the 394 per square mile cited by uninformed writers, but exceeds 2,900 per square mile of arable land. This is more than three and a half times the density of Italy or Germany with 809 and 816. The almost total lack of mineral resources upon which industries can develop aggravates the problem.

Many Westerners will say that birth control would solve this—which it will not. Let us face facts scientifically. In the first place, Dr. Ryoichi Ishii, whose recent book entitled "Population Pressure and Economic Life in Japan" contains the best study of this subject, clearly shows that over a short historical period of a century or slightly longer, the Japanese population increased in percentage or in ratio less than almost every western nation, including Great Britain and Germany, and of course, much less than the United States and the Soviet Union. Japan never did have as high a birth-rate as did the various European nations.

Crude Birth-Rate Increasing

The increase in population seems spectacular in Japan merely because it came during this century while the European countries went through the same experience some decades earlier when they had all the New World and the dominions to migrate to. The lag in Japanese population increase corresponds to the lag in industrialization. Various estimates by authorities like Professor Uyeda and Dr. Crocker indicate that the Japanese population will reach a stationary level around 95,000,000, somewhat larger than the earlier estimates.

With the increasing use of contraceptives and various social factors, the refined birth-rate of Japan is decreasing while the crude birth-rate of the country as a whole is increasing. This apparent paradox is easily explainable. Because the sudden increase in population came in the recent decades, the Japanese population contains a higher percentage of young people of marriageable age and under than in a stable country like England. This means that, although the average family perceptibly limits its numbers, since the future adults who will constitute the increase in the population to the 95,000,000 level are already born, birth control cannot solve this grave problem.

Certainly agriculture cannot absorb any more, for the farms already average only about two acres. Although they produce far more on the whole than the corresponding area in any other country, obviously they cannot support more. True, a certain English lady who thinks she is an economist asserted that Spain produced much greater yield of rice than Japan. The lady gets her funny figures by comparing the average of all Japan with a small, particularly rich acreage in Spain. She might have found an even better ratio by taking some hot house production and comparing it with the poorer sections of Japan.

As for industrialization, the members here know the story. When Japan tries peaceful economic expansion as liberals have told her she should, Japan receives vicious attacks about alleged dumping, "sweated labor," and "Yellow Peril." Her markets are closed and all types of restrictions placed, even in countries like the United States where she buys far more than she sells.

This is often done with complete smugness. Thus, even the labor groups in England which are supposed to be socialistic, sanctimoniously speak about the menace of Japanese trade in an African colony. Why? Because the poor natives who cannot afford to pay two shillings for their cloth can get it for one shilling which they can afford from Japan. From the point of view of the native, his standard has risen since he can purchase many things hitherto denied him. But, then that means "Yellow Peril," he is told, and for the glory of democracy and preservation of peace, the Japanese goods must be barred. The native knuckles under the dictation and goes without necessities in order to preserve British democracy—in England—which summarily decrees even as Hitler that he shall buy goods he cannot afford or go without. England is merely typical. In no sense are the British less tolerant than others for on the whole they are more so.

Let it be clearly understood that unless freer trade becomes a reality, unless nations like Japan can have freer access to raw materials and be able to pay for them in kind, and unless they are free of constant threat of being shut off at the whim of cliques and unfriendly governments, peace will remain an illusion for such peace merely sanctifies exploitation and injustice.

As the late Frank Simonds and as an increasing number of economists have become aware, peace has a high price which nations like Great Britain, the United States, France, the Soviet Union, and the Netherlands must be willing to pay. They must find means for the peaceful access to raw materials and payments in kind possible for the "have-nots." No amount of sanctimonious, sentimental piffle about peace, no amount of day-dreaming, will do any good. Peace requires hard thinking, courageous action, and real sacrifices. Peace is worth far more than the high price it demands, but that price must be met.

No Trade Conflict

By no means does this infer that relations between the United States and Japan conflict over trade for most fortunately the commercial relations between the two countries supplement each other. Only in a few items do the two nations compete, while overwhelming percentage of mutual trade, as Secretary Hull and the U.S. Tariff Commission have shown, supplies each other's deficiencies—such as American cotton and automobiles for Japan and Japanese silks and camphor for the United States. America is Japan's greatest market. In turn, Japan buys more from this country than any other nation in the world except Canada and Great Britain. Japan purchases more than all the rest of Asia put together, including the Philippines and China, and so the United States has a large favorable balance in its trade with Japan.

We all must face the fact that under-privileged nations and peoples, like under-privileged classes, will seek, and if necessary fight, to have access to vital raw materials. Only by making this possible peacefully can real security come. Otherwise, peace is but an armed truce.

Lastly, but of momentous importance, Japan faces a perennial crisis in her diplomatic relations because she has had the imperialism of all the major powers thrust upon her. For over two centuries, the Far East increasingly had become the colony of Europe and later even of America. All the talk about the "Yellow Peril" cannot detract in the least from the reality that the so-called white nations representing but a small fraction of the world's total population own or dominate all of the world, except Siam, parts of China, and Japan. Of these Japan alone has real sovereign power based upon its own strength as a world power.

India, East Indies, Malay States, Indo-China, Hongkong, Eastern Siberia—these belong to European countries which also either have concessions or claim spheres of influence over Shanghai, Tientsin, Outer Mongolia, Sinkiang, Tibet, Yunnan, and the Yangtze Valley. Imperialism has added variety to its methods. Europe and America can invade China to-day with bonds and loans, with control of air routes and customs, with concessions and rights, instead of soldiers and armed occupation. The results are just about the same; the oysters are eaten by the same walrus and carpenter that weep for them (Miyakawa made this observation before the present war.—Editor).

In other words, the serious strain in the Sino-Japanese relations primarily results from Japan's fears that Western influence

in China will endanger her own existence, even as the Russian occupation of Manchuria in 1904 nearly led to the extermination of Japanese independence. If Western nations gain semi-political concessions in China, the Japanese fear that unless they exact concessions from China counteracting them, their security would be encroached upon. The Japanese do not like this vicious system any more than the Chinese, but they feel that unless it is changed no other practical means of survival exist.

Territorial Integrity?

As Nathaniel Peffer so often states in his lectures, the struggle in the Far East is not between Japan and China but between Japan and the West for the dominance of East Asia, with China as the football field. Imperialists, it seems, deliberately raise all this talk about preservation of peace, of democracy, of territorial integrity, and sanctity of treaties to confuse the public. How much democracy do the natives of India or French-Indo-China find when they agitate for freedom or the right of public assembly? Jails leave very little for independent action.

How much territorial integrity does the old Manchu Empire or its supposed successor, China, have when Eastern Siberia, Outer Mongolia, Sinkiang, Tibet and Indo-China either belong to or are dominated by Europeans; when foreign inspectors control China customs and audit railroads; when American, European, and Japanese gunboats and marines patrol many inland waterways?

How much sanctity did any treaty have when within two centuries almost all of India, the vast Manchu Empire, and East Indies became colonies or semi-colonies of European powers? How did these millions upon millions of square miles of territory become colonies or spheres of influence? By scrupulous observation of treaties on part of the Western nations?

Do Western nations protest Japanese action because the Japanese are wrong, as they are sometimes, or because, as Peffer expresses it, Japan is spoiling their racket? Do the Western nations really want peace and justice? Then let them ponder over the words of one of the keenest British observers, the late Emil Dillon, who speaking of the Sino-Japanese relations said of Western participation:—

"And in all these dealings China's rights and the rights and interests of Japan were held in derision. It was thus borne upon me with what scant ceremony the birthright of the yellow races was being chaffered away by all those puritanical world reformers . . . I had the advantage of being in close contact with the whole fraternity of international peace-makers, whose deliberate purpose, which they avowed in private and implied in public, was to make Manchuria a country fit for only white heroes to live in . . . *The first token of sincerity on the part of the powers of the West would necessarily take the shape of amends and restoration of all the ill-gotten possessions.* And of this there is no sign . . . In the Lytton Report one looks in vain for a timely word on the peremptory necessity of racial equality as a condition of peace in the Far East, and for a clear definition of the present meaning of the sanctity of treaties . . ." (Italics ours).

Informed groups must take the initiative in arousing public opinion to the prerequisites for peace, for justice, for co-operative international relations, and the desirability of the resultant peace.

Tokyo to Bid Sayonara to Historical Gate

The Wadakuramon, one of the 36 mitsuke or castle-gates of the Yedo Castle, at Chiyoda-cho, Kojimachiku, will be taken away by the Imperial Household Ministry shortly because of its dilapidated condition.

The Wadakuramon formerly consisted of "Yaguramon" (a turret shaped gate), "Koraimon" (an outer gate of a castle), and "Wadakurabashi," a wooden bridge. The turret fell down by the great earthquake in 1923, and the other two remain

to-day, each being on the verge of collapse. In view of the fact that the Wadakurabashi Bridge is one of the two remaining wooden bridges of the Yedo Castle, it has been decided to take a photographic record of it. Its "Giboshi" or knobs of the bridge-posts will be preserved. The Koraimon gate will be kept in the Imperial House. The dismantling work will be carefully done so as to make it possible for rebuilding in the original state in the future.

Japan's New China Policy*

JAPAN no doubt has a national policy of her own, but what is regrettable is that it has not been sufficiently clarified so that the nation may readily co-operate with the Government in trying to enforce it. When we talk of a continental policy, however, the nation will realize, if but vaguely, that it is fighting to achieve the right enforcement of the policy in the current China Incident, on the issue of which Japan has staked her all. True, the nation unquestionably realizes its responsibility and duty for accomplishing the aim, but the essential nature of this continental policy and the concrete measures to obtain its actual enforcement have not yet been sufficiently clarified.

When Hachisaburo Hirao left for North China as supreme economic advisor to the Peking Provisional Government the writer gave views to him regarding the great turn that ought to be effected in Japan's national policy. It was roughly to the following effect. Japan, before the outbreak of the China Incident, was only a "have-not" nation, and her national policy had to be decided accordingly. But Japan to-day has under her control both North and Central China, as well as Manchoukuo, and the formation of one big economic bloc covering Japan, Manchoukuo and China will free her from the difficulty hitherto experienced as a "have-not" nation. Japan indeed has now jumped at a bound to the position of a "have" nation. In point of the raw materials thus to be acquired, it is expected that Japan will have an abundant supply of raw cotton, iron, salt, wool and coal. Oil is the only commodity we shall not be able to have. But in other respects, Japan to-day is believed quite resourceful even as a "have" nation. Therefore, Japan's national policy now must be formulated from this new angle.

Exploit Resources

If so, how are we to deal with the question of adjusting Japan's international accounts, which is one cause of her existing trouble? The plan to increase gold output, the export trade increase plan and many other measures may be conceivable. But what is most important is to exploit adequately the natural resources in North and Central China and try thus to supply Japan with those new materials which she has hitherto imported from other foreign nations. By this means Japan must endeavor to adjust her international accounts. Though the plan may be difficult to be worked out efficiently at once, three, five, or even ten years' strenuous efforts directed toward the solution of the problem will improve the situation. Or rather the situation must be tried to be improved in this way. After all, it is thought there is no other way to save the situation than to try to do so by establishing strong economic relations among Japan, Manchoukuo and China. From such a basic consideration it is believed that there will be seen a national policy strong enough to win the world's credit.

If we are to advance with this conviction, even though there may be difficulties at present, why should we dread them? It is necessary for us, the nation, to have sufficient perseverance and make enough effort to surmount them. Should we, however, half-way in this attempt try to seek foreign help or else accept their goodwill gestures, it would spoil all. Japan's only policy must be to establish a really efficient plan on a permanently workable basis from the standpoint of a "have" nation.

The general public optimistically thinks that Japan's position in the world will become very secure on account of the tri-lateral anti-Comintern accord concluded among Japan, Germany and Italy. Of course one is not inclined in the least to deny this. But the fact is that Japan's position to-day as a "have" nation, in point of resources power, is incomparably superior to that of Germany or Italy. Compared with those two nations, Japan is inferior only in the materials and the products of heavy industries, particularly of the arms industry.

Germany is superior to Japan (with Manchuria and North China excluded) only in the output of coal and also in the production of steel and copper. But in the holdings of gold or in the gold output it is incomparably inferior. Especially in the gold output it may be said that Germany is practically nil. In shipping, shipbuilding facilities and naval power, Germany comes far below

Japan. In point of staple food again, Japan to-day is a self-sufficient nation, while Germany must import 60 per cent of the supply from abroad.

Italy, compared with Japan, has nothing to show specially in its favor, in point of resources. Either in steel or in copper it is extremely poor. Coal or oil it is practically none. Nor has it the holdings of gold or the gold output. Shipping and shipbuilding facilities there are nothing to be talked of. Only in naval strength is it superior to Germany, but in other respects there is little for Italy to boast of.

Below is shown a table of resource strength of the three Powers, Japan, Germany and Italy.

	Japan	Germany	Italy
(1) <i>Steel production</i> : †			
1936	4,914	18,756	1,951
(2) <i>Iron ores</i> : †			
1936	1,208	7,570	858
(3) <i>Coal output</i> : †			
1936	38,068	158,283	806
(4) <i>Oil output</i> : †			
1936	334	445	17
(5) <i>Gold holdings</i> : ††			
1937 (at May end) ..	455	28	208
(6) <i>Gold output</i> : †			
1936	21,114	236	124
(7) <i>Shipping</i> : ‡			
1937 (June)	4,475	3,937	3,212
(8) <i>Ships built</i> : §			
1936	294	379	11
1930	151	245	87
(9) <i>Warships</i> : ¶			
1937 (Sept.)	761	124	307

Must Depend on Self

Placed in such a favorable position economically, Japan must quickly establish her definite continental policy, to ease the mind of the nation. The main point with respect to the enforcement of Japan's continental policy, however, is believed to consist in her effort to achieve its satisfactory enforcement by securing right operation of her wartime machinery. Japan, in the effort, must learn to depend on herself. She must not expect the Powers' sympathy or co-operation. She must work patiently and long to attain the goal, in the enforcement of her continental policy.

As one practical measure to attain the aim, I cried aloud, as early as last August or September, calling for the speedy establishment of national policy banks and the issuance of legal tender, both in North China and in Shanghai. I desired thus that those institutions, as organs of the Army, should display the merit of their working efficiency. But no such thing has yet materialized in Shanghai, though in North China, there has been established the China Federated Reserve Bank.

Most of the bankers and financial experts believe that economic matters will not be rightly solved by the power of the Army. Those people point out that as the financial and economic machinery in China to-day is operated by the legal tenders of the Four Banks, the notes issued by other banking institutions, and many other complex factors existing, the destruction of this system, if such should ever occur, would prove costly, for it would not be easy to cause its restoration. Therefore, instead of causing the destruction of the system, Japan should try gradually to replace those legal tenders and notes of the Chinese banks by the new legal tenders of new Chinese regimes, thus endeavoring to accomplish her original

(Continued on page 222)

*From the *Nippon Hyoron*, in the *Japan Times*

†In 1,000 metric tons

††In \$1,000,000

‡In 1,000 tons (gross tonnage)

§In 1,000 tons

¶In 1,000 tons (displacement tonnage)

Moscow Fears War*

ANYONE who has read pre-revolutionary novels knows that political disputation was once the great indoor sport here. By now it is practically a lost art in what is still called euphemistically the "new" Russia. The answer to every political or near-political question, like the verdict in every political trial, is prescribed in advance; this makes discussion and speculation not only superfluous, but, more to the point, dangerous.

But these questions are the staples of dinner and bridge table conversation in Moscow's foreign colony, Europeans and Americans, it would seem, have taken over the outlawed pleasures of political argument and indulge in them at length. Cut off from direct contact with the natives, the foreign contingents, diplomats, correspondents, engineers, salesmen, are driven in upon themselves, and Russia—past, present and future—is the inexhaustible theme of their talk.

Curiously, the fear of war is not nearly as keen among the common people here as it is, in many European countries. The war scare has been with them so long, so loud, so boringly, that Russians have become accustomed to the idea; they take their "capitalist encirclement" and all that it entails as granted. The foreign colony, however, is aware that at this juncture the resounding cries of "Wolf! Wolf!" are more than a propaganda trick. They know that the civil strife in Spain, the undeclared war in China, the tightening alliance of Italy, Germany and Japan, unquestionably confront the Soviet Government with the most critical situation since the defeat of intervention in 1921. Often we have doubted whether those in the Kremlin who sounded the war alarms were really alarmed—but this time there is no doubt.

The clinching excuse for Stalinism, therefore, sounds more convincing to-day than ever before in his sanguinary regime. That excuse, of course, is the need for military preparedness at any and all cost—in sacrifice of life and liberty for the people in Elephantine brutalities and "liquidations" in concentration camps and forced labor, in fantastic terror and tyranny.

The Five-Year Plans

The Five-Year Plans, when all is said and done were war plans. Even the armies of slave labor mobilized by the OGPU contributed—and are still contributing—to the defense capacity of the country; they have built strategic railroads, canals, deepened harbors, developed important chemical and mineral resources—things which could not have been achieved so quickly or so cheaply with relatively free labor. The bloody taming and callous exploitation of the peasants to pay for industrialization before industry could pay them back in manufactured goods was essential part of the scheme, so the collectivization and its attendant horrors, too, were war measures. And there is small doubt that technically the USSR is far better prepared to meet foreign foes than it was before the advent of the Stalin dynasty. Despite tragic break-downs, periodic purgings of the higher industrial command and endless evidence of fearful waste and inefficiency, Russia does have its own munitions industries.

It turns out airplanes almost as fast as a Detroit plant turns out motor-cars. Its communications system is greatly improved, particularly in the Far East. It possesses a brand-new chemical industry. At the same time it has trained a vast personnel for handling these new instrumentalities of power. The argument, however, is by no means that simple. There are those, who believe that the inhuman speed and pressures and systematic cruelties of the Stalin years have rotted the fiber of the Soviet Union, to an extent which no amount of iron and steel can repair. The morale of the country is shot to pieces. It is a cowed, embittered, pass-

portized, debilitated, bewildered people who will be driven to war; a sullen people forced by 20 years of hardship to place personal survival above all other ideals and loyalties.

Kremlin Dreads War

The Kremlin dreads war and will go to any humiliating length to avoid it, despite the fact that it has a strong technical base for warmaking, droves of fighting planes, a huge army, oceans of poisonous chemicals, great food reserves. The simple truth is that it fears its own people more than it fears outside enemies. Stalin is not blind to the risk of placing guns again in the hands of a disarmed peasantry, has too many fresh wounds from the days of forcible collectivization and too many immediate grievances.

The Kremlin's hope, should war be forced upon it, lies in a concentrated, mechanized conflict of airplanes, tanks and poison gas, and a quick victory. A more protracted war, requiring wide mobilization of its subjects, would open the regime to internal dangers, such as the Romanovs faced in 1905 and 1917.

The one thing that the Soviet dictatorship will not willingly hazard is a test of the patriotism and loyalty of the Russian masses. The Kremlin insists day after day that its country is honeycombed with spies, saboteurs, political bandits, Trotskyists, parasites, decayed social elements, hirelings of Japan and Germany, counter-revolutionists, etc. Whether this be true or largely a phantasmagoria conjured up by an imagination disordered through fear, it must be placed in the scales of argument in estimating the defensive strength of the country. How will a nation in such a condition stand the shock of a foreign attack? What of its fighting stamina, its patriotic zeal, its ability to weather military reverses without turning on its overlord?

Embitters Nation

Military preparedness as the final apology for the horrors of Stalin's regime becomes meaningless, if in building its war machine the Soviet dictatorship has crippled and alienated and embittered the nation which must operate that machine. On the edge of war (as it seems at this writing) there is little of the flaming patriotism, the will to conquer, the intrinsic national unity which are as important in the final reckoning of a long-drawn war as tanks and planes.

One more thing needs mentioning to round out the discussion. In the first half of its existence the Soviet regime counted, with good reason, upon the support of sections of the common people in other countries in the event of war. The Third or Communist International was a real force in the world. In the second half, following the advent of Stalin, the strength quickly ebbed from the body of the Communist International, shattered by repeated cleansings and drained of all vitality by the Kremlin's authoritarian methods. The Soviet Russian people gave Fascist movements abroad their most effective ammunition for propaganda and for self-justification. In short the item of proletarian support abroad, particularly behind the enemy line, may be safely stricken from the list of Soviet claims of strength.

Thus the appraisal of this country's strength and weakness as the war draws nearer is made these long Winter evenings in Moscow wherever foreigners meet. One diplomat of a neighboring country here, knowing the Russian language and knowing the Russia of pre-revolutionary days, insists that the peasants are praying for war as their only avenue of release.

*American Mercury

South Manchuria Railway's Heavy Profit

The returns for the South Manchuria Railway Company for the business year of 1937, beginning from April 1, last year, and ending March 31, this year, passed the 300 million yen mark and the railway company earning a net profit of some 52 million yen.

Including 20 million yen obtained from the transfer of the Heavy Industry Company's shares to the Manchuria Heavy Industry Company and 10 million yen of dividend from its subsidiaries, the total profit reached 82 million yen.

The Singapore Naval Base

(From Dock and Harbor Authority)

SINGAPORE Naval Base lies on the North side of the Island of Singapore, being to the East of the Johore Causeway, which, completed of recent years, connects the island by road and rail with the mainland. In area the base covers nearly 2,400 acres, that is, about four sq. miles, and it has a water frontage to the Straits of Johore of about $4\frac{1}{2}$ miles in length.

When preliminary work was commenced in 1923, this area consisted of rubber plantations interspersed with jungle and swamp. The necessary land for the Naval Base was acquired by the Government of the Straits Settlements, and presented to the Imperial Government. After a short abandonment, preliminary work was recommenced in 1925, and took the form of clearing of rubber and jungle, surveying, sinking trial pits and driving boreholes into the earth in order that the design of the various works might proceed and be planned to the best advantage.

The Base was designed by the Department of the Civil Engineer-in-Chief at the Admiralty, and a contract for the major civil engineering portion of the work necessary to form the dockyard was commenced by Sir John Jackson & Co., Ltd., in 1928, and completed in 1936. The Civil Engineer-in-Chief at the Admiralty, at the time when the design and contract particulars were prepared for the work, was Sir Leopold Savile K.C.B., M.INST.C.E., who was accordingly responsible for the design of the wharf walls and the graving dock, etc.

Constructional Operations

The constructional works were commenced under his direction and completed under his successors, Mr. T. B. Hunter, C.B., O.B.E., M.INST.C.E., and Mr. A. L. Anderson, C.B., M.INST.C.E.

This contract included the construction of the Dry Dock (which is 1,000-ft. long, 130-ft. wide at the entrance, and has a depth of water of 35-ft. at low tide), together with the formation of wharf walls, 2,200-ft. in length, having 40-ft. of water alongside at low water, and 2,970-ft. having 30-ft. of water. Part of this latter is in the form of a Tidal Basin, alongside which are large transit sheds for the purpose of handling the various Naval stores, and nearby which will shortly be erected commodious storehouses.

The Caisson at the dock entrance was constructed by Messrs. Sir Wm. Arrol & Co., Ltd., and the dock pumping machinery by Messrs. Gwynnes Pumps. Ltd.

Included in the contract were the levelling and preparation of the dockyard area,

together with the driving of piled foundations for many of the workshops, which are now in course of erection.

Quantities of Work Executed

A few figures will be of interest in giving some idea of the magnitude of this contract.

The preparation of the site involved the removal of about eight million cu. yds. of earth, of which, of course, a large quantity came from the excavations for the dock and wharf walls. This material was used to reclaim swamp areas required in connection with other parts of the Naval Base and, in all, some 450 acres of swamp were thus converted into useable ground, on which to-day buildings are being erected.

To enable the wharf walls to be used, about five million cu. yds. of material was dredged and taken to sea. These walls and the dock consumed between them over one million cu. yds. of concrete and about a quarter of a million cu. ft. of granite blocks.

The granite for this concrete and for most of the blockwork was obtained from a hillside in the State of Johore, and from there was transported by temporary railway tracks through four miles of jungle to the Straits, across which it was conveyed in train ferries, each

of about 100 tons capacity. The granite for the Caisson and Penstock faces in the dock was obtained from Cornwall.

To carry out the contract, the contractor had to lay about 16 miles of temporary railway track, and employed 4,000 to 5,000 coolies, practically all of whom were housed in lines on the Base.

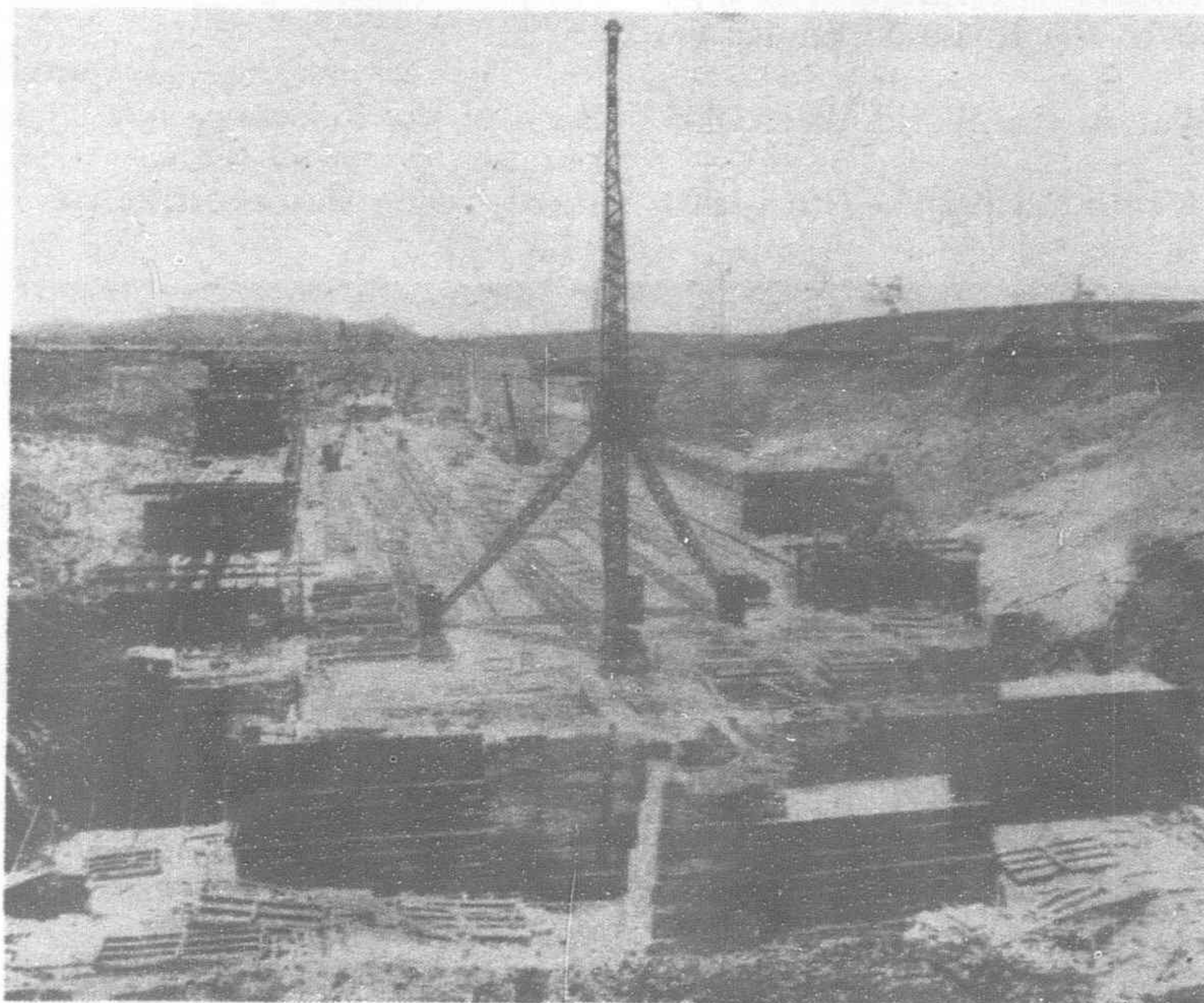
The work also involved the diversion of a river, the winding mouth of which was diverted by means of a new channel to join that of another river about a mile away.

The primitive communications within the area which existed before work was commenced have now been transformed beyond recognition. A wide motor roadway, with railway alongside, now runs from one end of the base to the other, and on a hill to the south of this road stands a large concrete reservoir, holding nearly six million gallons of water, fed from the main Singapore supply. The railway is connected to the Federated Malay States system, and the road unites the two public roads to east and west.

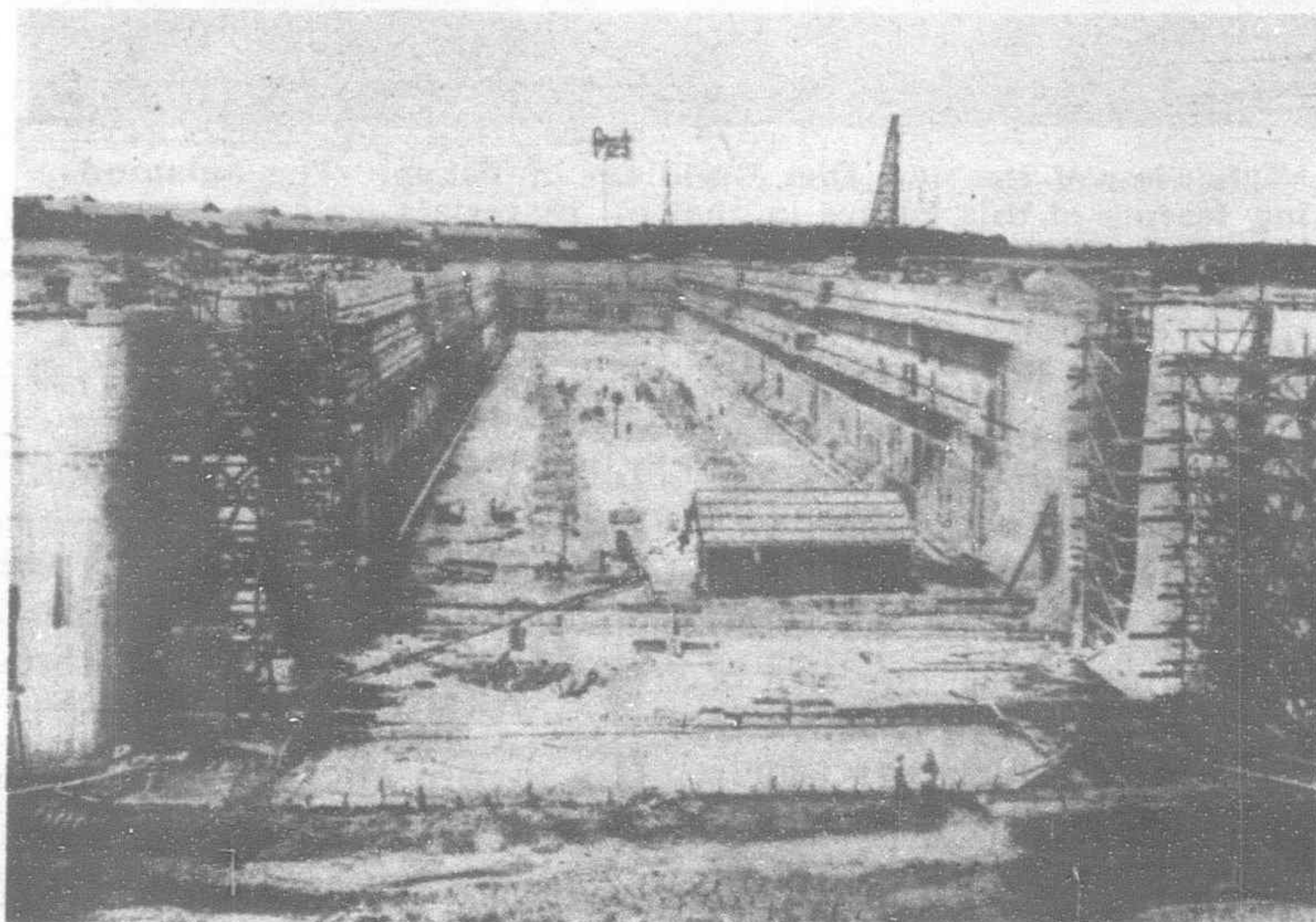
Within the Base itself, roads and railways have been constructed, and work is proceeding rapidly on the erection of the various workshops, offices, etc., requisite for a dockyard.

The Base is in itself a miniature self-contained township.

(Continued on page 222)



Constructional operations in progress at Graving Dock (May, 1932)



View of Graving Dock in September, 1934, nearing completion

Japan's Advance in the Cement Industry

By ZENZO HATANAKA, Managing Director, The Nippon Portland Cement Association

(In The Japan Times)

IN writing a history of the development of Japanese Portland cement, covering a period of 68 years, one cannot help observing the different stages of progress which mark distinct eras of historic significance. These progressive stages are also observable in the development of industries, but it appears that in the case of the cement industry in particular these stages are conspicuously marked:

- (1) From beginning to the Sino-Japanese War, 1871-1895)
- (2) From the Sino-Japanese War to the Russo-Japanese War (1896-1904)
- (3) From the Russo-Japanese War to the World War (1905-1914)
- (4) From the World War to the Kanto Earthquake (1915-1923)
- (5) From the Kanto Earthquake to the Manchurian Incident (1924-1931)
- (6) From the Manchurian Incident to the Present (1932-1938).

I.—From Beginning to the Sino-Japanese War (1871-1895)

In 1871, fully 47 years after Portland cement was invented by Joseph Aspdin in England, the first Portland cement factory was established in Japan. Japan was the fifth country to erect a cement factory, in the world with England, France, Germany and Belgium, in the order named.

Japan, at that time, had just completed the political revolution of the Restoration and was facing the dawn of the industrial revolution, aspiring to adopt the European industrial system, under a capitalistic economic structure. The Government assumed the lead in this work of industrial development, establishing model factories in different industries under Government management.

Model Factories.—These model factories comprise a peculiar feature of the early stages of Japan's industrial development. Cement was no exception. In 1871 the Public Works Bureau of the Home Ministry erected a model cement factory at Fukagawa, Tokyo, which marked the beginning of the cement industry in Japan. In the succeeding 68 years the cement industry has been steadily progressing until to-day Japan is internationally known as a producer of the highest grade cement, exporting a large quantity to all parts of the world.

The Fukagawa factory was established under the direction of Saburo Utsunomiya, a scientist who had just returned from a trip abroad. He based his plan on the wet process which was widely in use in the Medway district in England, and incorporated in the factory his own creative ideas. This process was adopted by other cement factories that followed the Fukagawa factory until the dry process was introduced in 1887.

The Fukagawa factory at that time had a production capacity of 10,000 barrels per year. The capacity was later increased with commendable results. But the financial difficulty of the Government plus the prevailing doctrine of *laissez faire* compelled the authorities in 1883 to transfer the whole undertaking to private hands. The late Soichiro Asano succeeded to the management of the factory. His persistent and untiring efforts brought into being the present Asano Cement Company, one of the largest cement producers in the world.

The two or three years previous to the Government's abandonment of the Fukagawa factory may be designated the second preparatory period of the industrial revolution. During those two or three years the construction of railways and European-style structures increased markedly, calling for a larger output of cement. The Fukagawa factory increased its output capacity. The Onoda Cement Company was established at Onoda, Yamaguchi prefecture. The Onoda factory was set up with the advisory assistance of Mr. Utsunomiya in 1881, and was the first cement factory to be started by private capital. The work of Onoda progressed so satisfactorily that the company now stands as one of the largest cement producers, second to Asano.

Factories Increase.—In 1882 a cement factory was built in Tahara, Aichi prefecture, and another in Kawanami, Osaka prefecture. The one in Tahara was the forerunner of the Mikawa Cement Company of to-day. In 1883 a cement factory was started in Shimizu, Shizuoka prefecture, and in 1885 another at Tomikawa-cho, Tokyo. The Tomikawa-cho factory has been operating up to the present as the Nippon Cement Company, although the factory itself was closed later.

The Onoda in 1887, by hiring a German expert, shifted to the dry process, and gradually discarded the unscientific and primitive methods which depended largely on experience and adopted a more scientific

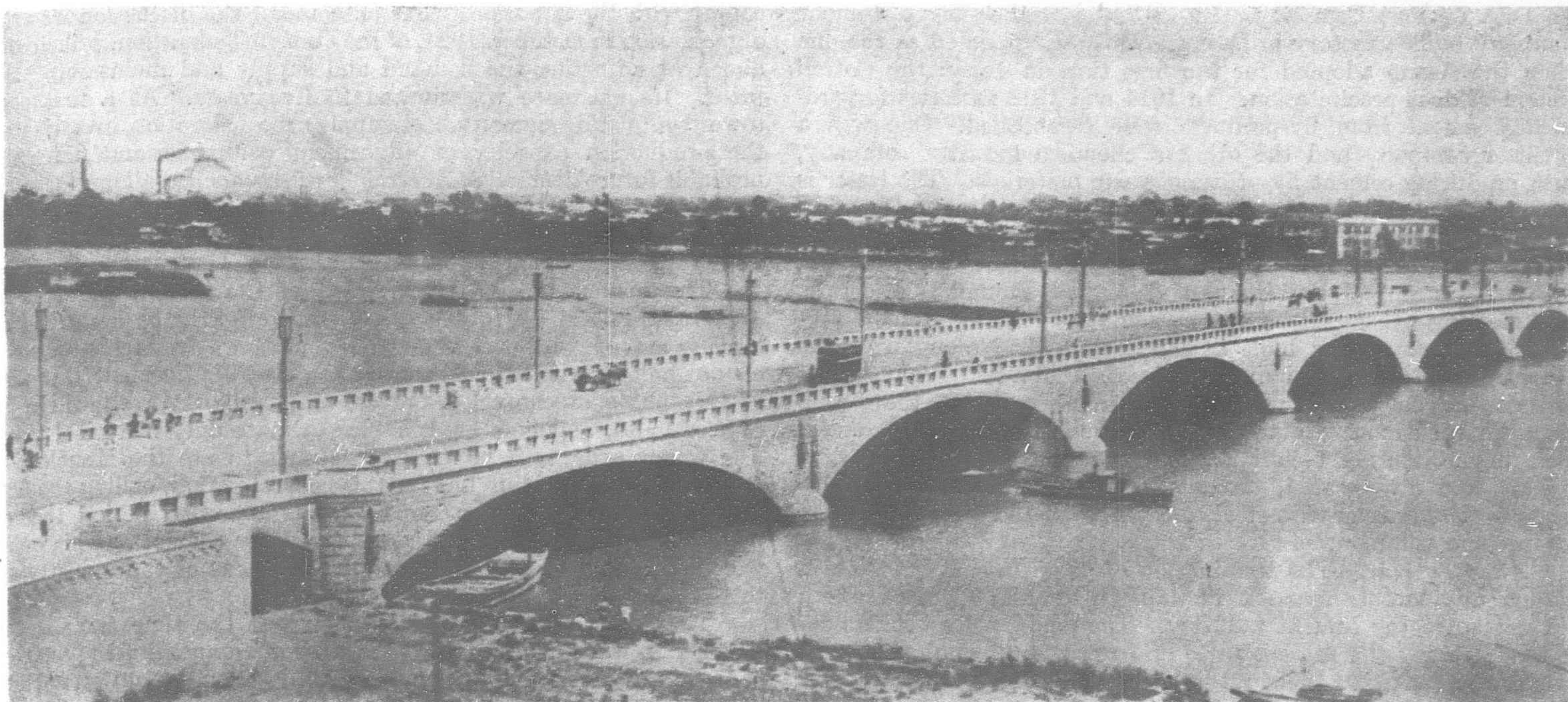
and mechanical system. The cement factories later established were: one at Atsuta, Aichi prefecture (1887), at Saruecho, Tokyo, Kizukawa, Osaka and Ajikawa, Osaka (all in 1888), at Yatsushiro, Kumamoto prefecture (1889), Kami-iso, Hokkaido and Hirai, Okayama prefecture (both in 1890) at Kurosaki, Fukuoka prefecture, and Moji (both in 1892). Thus the cement factories were fairly well distributed throughout Japan Proper.

II.—From the Sino-Japanese War to the Russo-Japanese War (1896-1904)

Japan's overwhelming victory in her first war with modern war equipment caused the industrial revolution to bloom in all its



Night view of the new Diet Building, in Tokyo. The outstanding feature of this edifice in that all materials used in its construction were produced in Japan, of which cement played an important part



Japan's new Bandai Bashi bridge. The effective spans are 142, 151, 154, 154, 151 and 142 feet, respectively

glory. Japan's industry, from the stage of self-sufficiency, stepped forward toward the exploitation of overseas markets. The cement industry, too, having emerged from the primitive stage progressed into the first period of constructive development. In 1896 the total output of cement in Japan reached 170,000 metric tons, and Japan left the ranks of importers and became an exporter of cement.

Regarding the cement factories erected following the Sino-Japanese War may be mentioned one at Shioe, Kochi prefecture, built in 1896, which has developed into what is known to-day as the Tosa Cement Company; one each in Fukuoka, Saga and Mie prefectures, all in 1897.

Cement Packing.—The Onoda in 1898 began using hemp bags, in addition to the barrel, in packing cement. Together with paper bags, adopted years later for the same purpose, these innovations revolutionized the transportation of cement. Asano in the same year imported a tube mill, while the Onoda imported the Dietch kiln. The installation of the Dietch kiln proved to be of great significance in the general development of the industry.

In 1901 the Association of Japanese Portland Cement Engineers, which had been in the process of organization for the previous two or three years, held its first general meeting in Tokyo. It has held 23 general meetings since, and has announced from time to time the results of technical studies at home and abroad, contributing much toward a general improvement of cement. The association has headquarters in Osaka, where it carries on its work.

The installation of a rotary kiln from the United States in the Fukagawa factory of Asano in 1903 was an epochal event in Japan's cement industry. It was a small one, six feet in diameter and 60 feet long, but the benefit derived from this kiln was great. It helped to increase the production capacity and improve the quality. These ten years brought the first great stride and the cement industry. Although the industry suffered more or less difficulty, it made a sharp upward curve as a whole. In the matter of management, it was noted that small-scale factories, under individual management, changed over to stock companies, reflecting the beginning of a large-scale industrialization and concentration of capital. In the field of production, the import of the rotary kiln gave the cement industry the aspects of a real modern enterprise.

III.—From the Russo-Japanese War to the World War (1905-1914)

Whereas Japan staked everything to win over one of the most powerful nations in Europe in the Russo-Japanese War, the effects of the war on Japan's economics were highly important. When the war ended with Japan as the victor, there began an epochal era in the development of national power, which enabled the Empire to stand shoulder to shoulder as an industrial nation with the most advanced states in Europe and America. The Agriculture and

Commerce Ministry in 1906 announced the Portland Cement testing method, with the adoption of which Japan's cement industry emerged from the stage of imitation and advanced into the creative stage.

To promote mutual welfare and advance the cement industry in general, the Japanese Portland Cement Association, organized in 1909, has been devoting its energy to the cultural side of the industry. But the cement industry at the time the association was organized was yet in its infancy, with the number of cement producing companies at only 18, with 22 factories, a total capital of about Y.18,000,000, and an output capacity only 440,000 metric tons per year.

The revision of the testing method, the adoption of the rotary kiln and the utilization of the surplus heat from the rotary kiln for producing electric power materially helped in the development of the industry. With each plant producing its own motive power, the cost of production was reduced and economies could be made in factory plans all around. Whereas even in the United States only about 53 per cent of the cement producers generate their own motive power, in Japan practically 90 per cent have adopted the system.

Among the factories started to these days may be mentioned the Toa Cement Company, at Amagasaki, near Kobe; a factory at Sukegawa, Ibaraki prefecture, which has become the present Hitachi Cement Company, the Iwaki Cement Company in Fukushima prefecture (all in 1907) and the Dairen factory of Onoda in 1909. However, the sudden expansion of the industry as an aftermath of the Russo-Japanese War brought on a reactionary depression, forcing a number of cement companies either to amalgamate or close their factories. Immediately preceding the outbreak of the World War, in 1914, the number of cement companies was 17, factories 20, total capital Y.26,000,000, the annual output 63,000 metric tons and exports 40,000 metric tons.

IV.—From the World War to the Kanto Earthquake (1914-1923)

While the Powers were locked in a life and death struggle in the World War, Japan extended its production capacity, revised the production system and raised its industries to the general level of the world. The cement industry, too, enjoyed an unprecedented boom, cement being sold at rates as high as Y.22 per barrel (Y.3.50 at present) and completely monopolized the Oriental markets in exports.

Along with this prosperity, manufacturing processes also showed epochal progress. In 1916 Asano installed at its Moji factory a Compeb mill, nine feet in diameter and 200 feet long, the largest in Japan at that time, which formed the basis of what is known to-day as the Tube mill. Later, a factory was built in Wakayama and one in Oita prefectures, which were bought later by

the Oita Cement Company. In 1917 the Osaka Yogyo Cement Company built a factory in Osaka. This year is noted as the one when the Asano adopted for the first time in Japan the Cotrell system of dust precipitation. In 1914 and 1918 factories for producing cement from by-products were established. One was a fertilizer company and the other a chemical industry company, both producing cement by utilizing waste materials. The latter is what is known to-day as the Omuta factory of the Electric Chemical Industry Company. In 1918 the Oita and Hokoku Cement Companies were established. The first built its factory at Tsukumi, Oita prefecture, and the Hokoku at Karita, Fukuoka prefecture, also merging others already operating. At Minato, Aomori prefecture, a factory was built in the same year. Along with the general development of industries during the World War, cement factories began appearing in larger numbers. But they were equipped with modern machinery and showed marked progress in their manufacturing technique. The vertical kiln, for instance, already had disappeared, the motive power was electricity, the larger type of crusher with steel balls was used and the wind separator became common.

After the War.—The termination of the World War caused a sudden unfavorable reaction in Japan's industrial circles which did not spare the cement industry. The demand for cement decreased, forcing the market price downward, and some producers voluntarily restricted their output. The difficulty in management was gradually felt by all companies. However, plans for enlarging the old plants and starting new ones apparently were not affected by the depression. The number of new ventures increased. In 1919 a new factory was built at Oyemachi, Nagoya; in 1923 the Chichibu Cement Company was established at Chichibu, Saitama prefecture; the Ube Cement at Ube, Yamaguchi prefecture. In the meantime, in 1920, the testing method was revised for the third time, encouraging further improvement in the quality of cement.

While the cement industry was thus suffering in general from depression and over-production, the great Kanto earthquake occurred on September 1, 1923, leaving Tokyo, the political and economic nerve-center of the Empire, and Yokohama practically in total ruin. But the undaunted spirit of the Japanese was demonstrated. Quake and fire-proof buildings began steadily appearing. During the restoration of the economic structure, the cement industry enjoyed a busy time, however temporarily, in meeting the demand for the reconstruction of the capital.

V.—From the Kanto Earthquake to the Manchurian Incident (1923-1931)

The cement industry was temporarily stimulated by the reconstruction work following the Kanto earthquake, but it suffered an unfavorable reaction the next year. Among the representative cement companies, seven failed to pay dividends and six were barely able to declare a nominal dividend. As the situation threatened the failure of all cement manufacturers if it was left to take its own course, they came together to discuss means of

coping with the situation. The outcome of the discussion was the organization in October, 1924, of the Cement Federation, principally aimed at adjusting the demand and supply and maintaining the price. Its existence was limited to five years. As a first step toward adjusting demand and supply, the federation investigated the production capacity of all cement companies and, fixing the probable future demand at a certain level, compelled all producers to curtail production, prohibiting at the same time any plan to increase the output. As a means of maintaining the market price, a minimum price was agreed upon.

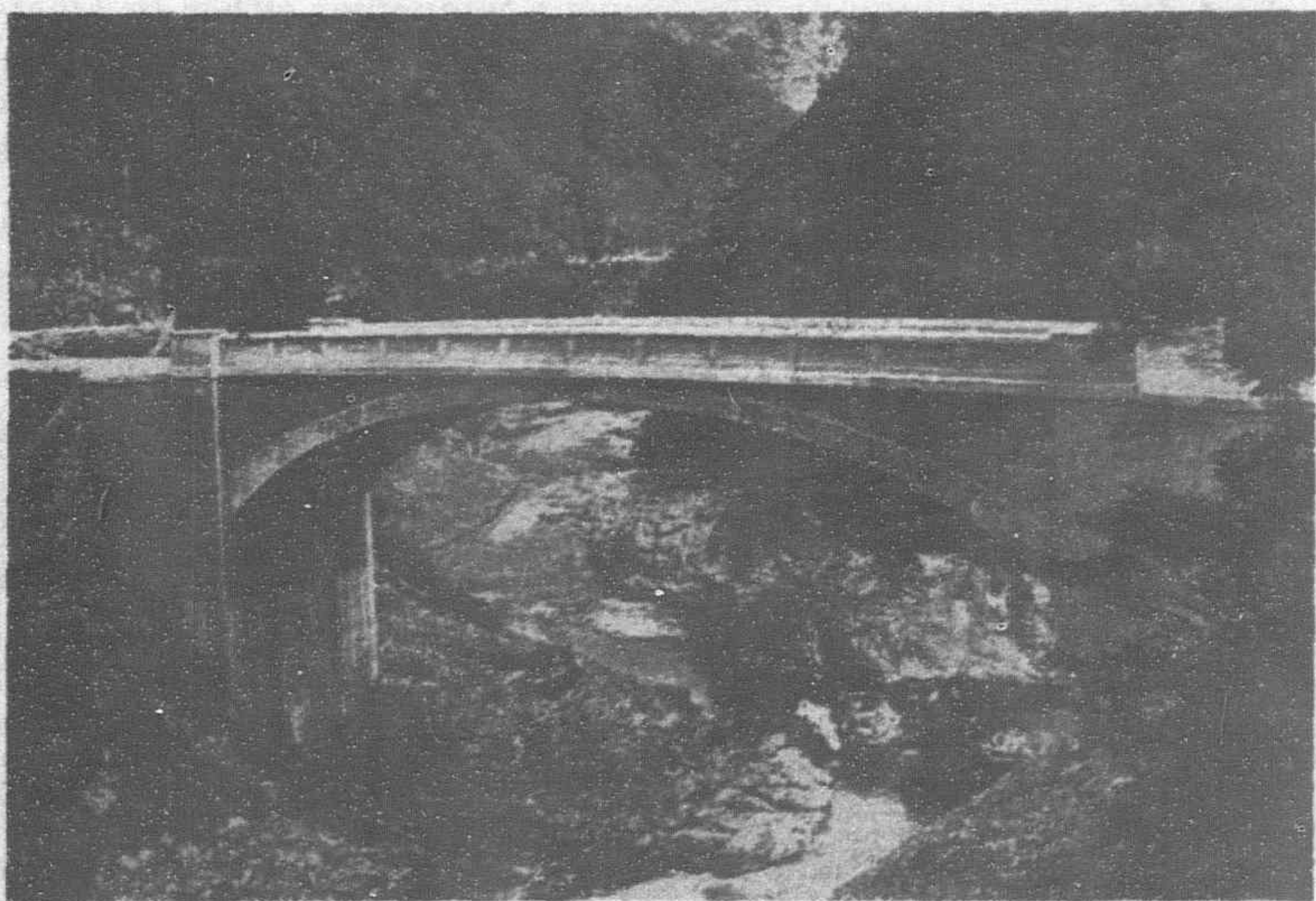
The history of the development of the cement industry in Japan from 1924 up to the present may rightly be described as having moved with the Cement Federation. In fact, the story cannot be told without reference to the control of cement. Details of this phase of control, however, may be written elsewhere by someone else, and here let it suffice to state only historical facts. The writer believes it more advantageous to use the Manchurian Incident as the dividing line for this control period, calling the first period that of production control and the second period that of production and sales control (or compulsory control). This order will be followed in describing the development of the industry up to the present.

The status of the cement industry at the time the Cement Federation was organized was: Number of companies, 23; number of factories 32; capital invested Y.156,820,000; annual production capacity about 2,970,000 metric tons; actual output 2,200,000 metric tons; amount exported, 100,000 metric tons. Compared with the condition ten years earlier, at the time of the outbreak of the World War, the number of companies had increased by six, that of factories 12, the total of capital had increased by six times, the actual output by 350 per cent and exports by 250 per cent, showing marked progress all-round.

Standard Weight.—In 1925 the plan for standardizing the weight of contents was realized, fixing the weight of cement per bag at 50 kg. and that in a barrel at 170 kg., and the custom of putting 380 pounds net in each keg came to an end. Other systems of weights, excepting in the case of exports, disappeared. In the same year the testing method of the blast furnace cement was officially announced.

The Osaka Yogyo Cement Company, in 1926, succeeded in producing the high grade Portland cement after a long and thorough study, and obtained a patent in 1927. This was the first high grade Portland cement produced in Japan. In 1922 Agriculture and Commerce Ministry's testing method was abolished, and a new engineering standard (JES No. 28) was adopted by the Ministry of Commerce and Industry regulating the process of manufacture and quality of Portland cement. At the same time, another engineering standard was adopted for blast furnace cement.

The three years that followed the organization of the Cement Federation brought nothing notable, other than mergers of some companies or increases of capital. The industry as a whole naturally increased gradually its output and consumption, except for the erection of a new factory at Nishi-Minato, Ishikawa prefecture, by the Nanao Cement Company in 1926. But the financial



The Watakawa-Bashi bridge. It has a one-hinged arch with effective span at 28 meters



The effective span on the Hijiri-Bashi is 106 meters

panic in 1926 seriously affected the industry. The demand decreased, augmenting the stock in the warehouses and making necessary a reduction of output, and, in turn, provoking sharp competition in price-cutting. The price took a great slump. The panic subsided the next year and the industry was restored to normalcy, activity being centered in the improvement of mechanical equipment and amalgamation of companies.

At the end of 1928 the five-year term of existence of the Cement Federation expired, and it was agreed to extend its life by another five years. In 1929 the deflationary policy adopted by the Government markedly depressed Japan's economics, and the cement industry, in view of its immense capital, found itself facing over-production and acute financial difficulties, with the stock in warehouses piling up. However, the export trade suffered no effects to speak of, revealing itself as the stabilizing force in the industry as a whole.

Lax Control.—After the entry of the federation into its second five-year term, laxity of cartel control appeared with the increased output and erection of new factories. Onoda built a factory at Sennai, Chosen (1927), another at Fujiwara, Mie prefecture (1929), Asano one at Nishi-Tama, near Tokyo (1928) and the Taihei Cement Company was established in 1931. Plans of cement companies for increasing their output were announced in rapid succession. The situation in 1928 showed 19 cement companies, operating 33 factories, with a capital of Y.203,280,000 invested, an output capacity of 5,000,000 metric tons, an actual output of 3,820,000 metric tons and exports of 340,000 metric tons. Compared with the situation five years before, when the federation was first organized, the number of companies had decreased by one and the factories increased by one, reflecting the amalgamation of companies. In the total capital invested, the amount had increased by Y.46,460,000 due to further efforts for improvement of mechanical equipment, consequently increasing the actual output by 162,000 metric tons and export trade by 240,000 metric tons.

The year 1930 is marked by a thorough understanding by all companies of the significance of the term "rationalization." There was much improvement in factory provisions, but what proved most noteworthy was the organization of seven regional sales associations as a preliminary move toward the organization of a national sales association.

The Cement Federation hitherto had devoted its energies to output control, and the need of sales control was universally admitted. It was agreed to permit free competition under cartel control. In 1931 the national sales control association was organized to supervise the regional associations, bringing about a revolutionary change in the system of the cement industry. By means of this national organization, along with the curtailment of output, the cement market was materially stabilized.

The outbreak of the Manchurian Incident marked an epoch in the cement industry. With the birth of the Manchou Empire cement manufacturers decided to make large exports to the new Empire, along with the advance of Japanese capital into Manchoukuo. As to the export trade, due to boycotts of Japan's goods, traced to the misunderstanding abroad of Japan's Manchou

policy and the adoption of protective tariff walls, quota systems, and so forth, overseas business began suffering a slump.

VI.—From the Manchurian Incident to the Present (1932-1938)

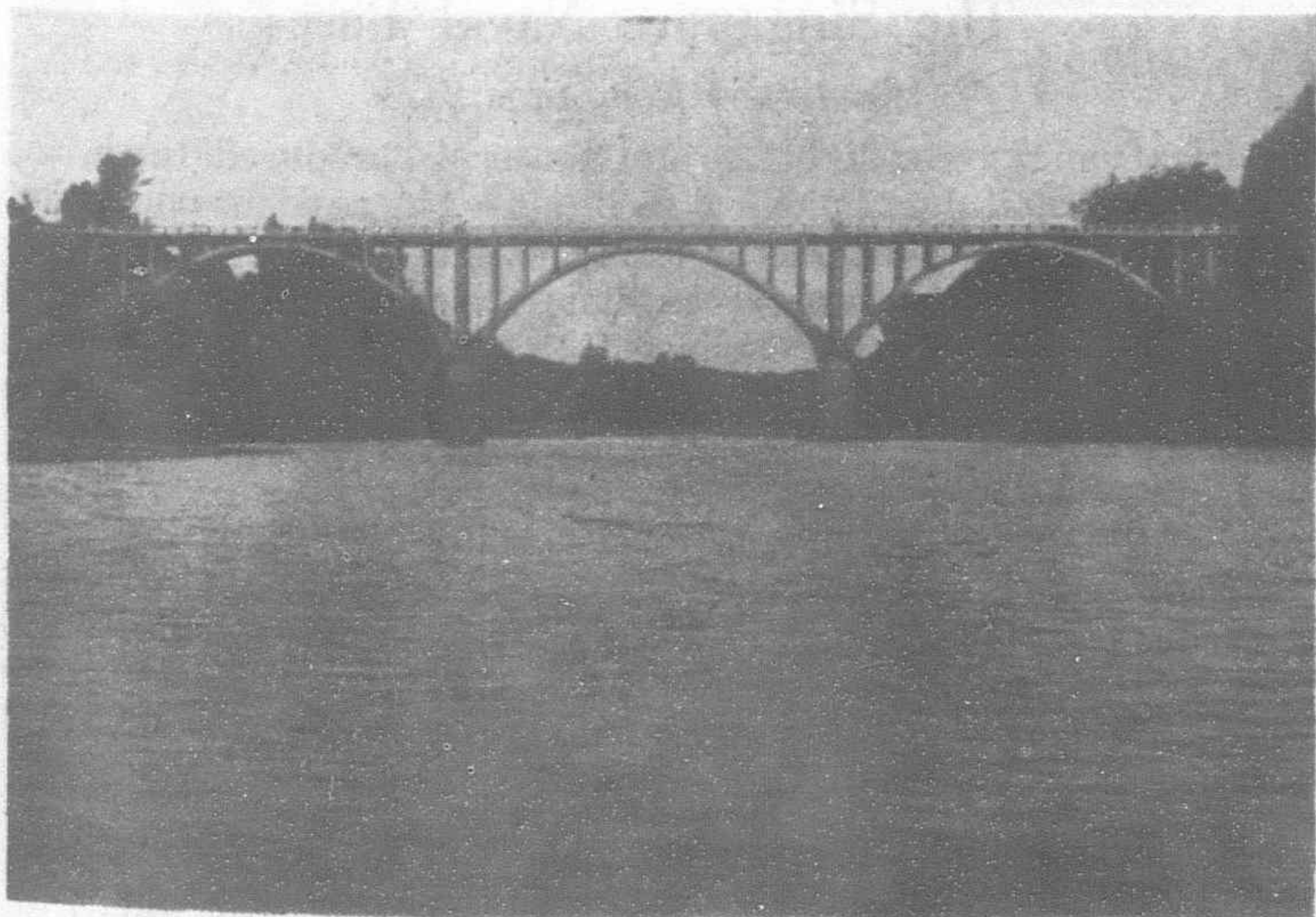
The year 1932, favored by a low exchange rate due to the second ban on gold exports and by a boom due to high commodity prices, coupled with the inflationary policy adopted by the Government for the relief of the current situation, brought a brisk activity to the cement industry. The next year, 1933, brought further activity with the creation of the Empire of Manchoukuo. But it was regrettable that because of the low exchange rate, exports of cement provoked suspicion of dumping abroad, leading to many misunderstandings and restrictive measures. However, as a result of this overseas condition, an export cartel, called the Japan Cement Export Association, was organized. The organization of this association placed the cement industry's output under a triangular control.

The stabilized condition of the cement industry further encouraged active development of the industry. New companies and new factories appeared in rapid succession between 1932 and 1935. In technical development, a feature event was the installation of the Lepold kiln made by the Polysius A.G. of Germany, by the Mikawa Cement Company, in 1933. This kiln has a special device for fuel economy and was later installed by several other companies.

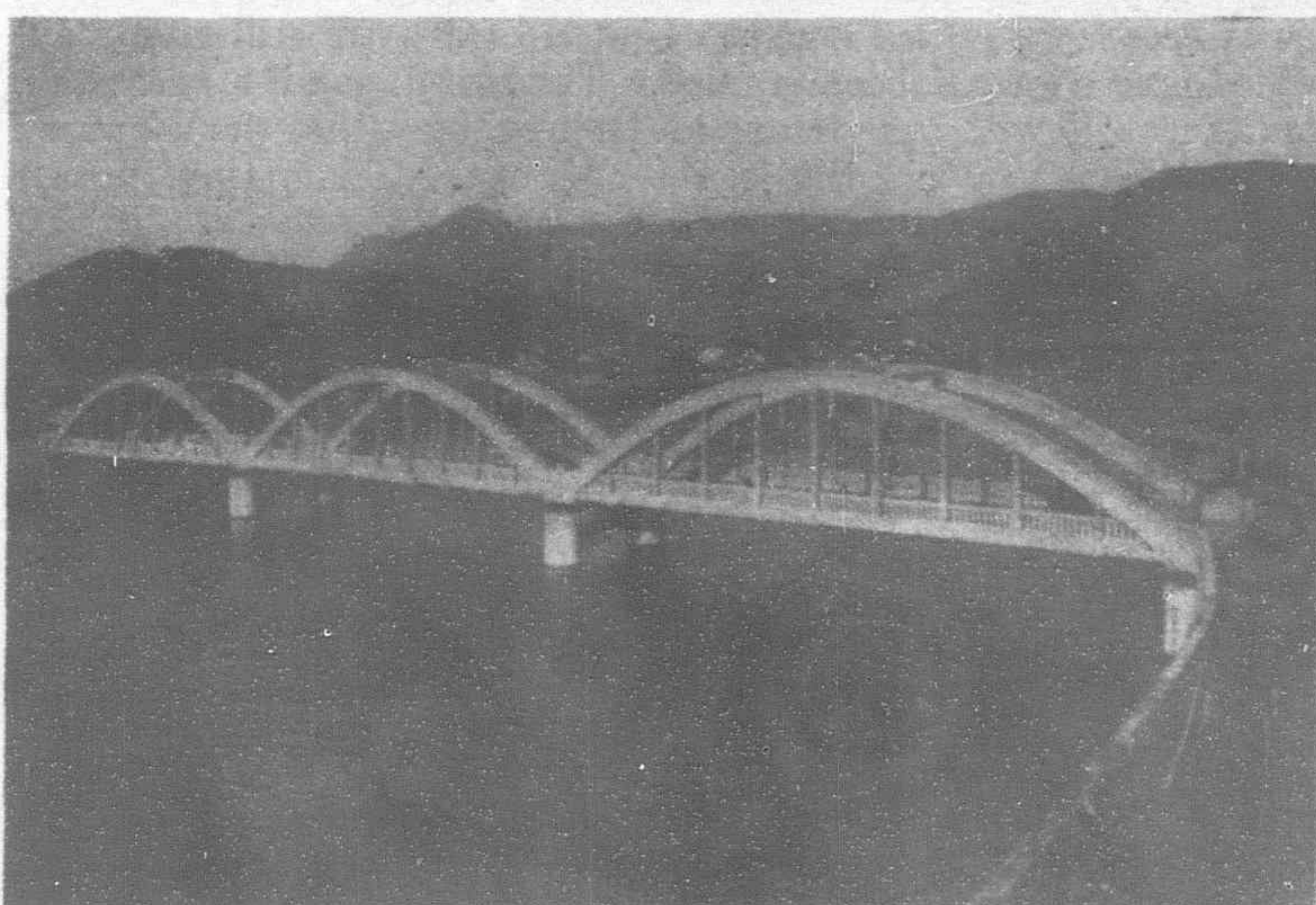
In the Autumn of 1934, in and around Osaka, the industrial hub of Japan, a great storm struck, leaving ruin in its wake. This caused a temporary demand for a large quantity of cement for reconstruction work. However, since the cement companies had a total output capacity of 10,000,000 metric tons, causing more or less uneasiness, it was suggested that some means of adjustment be found, taking advantage of the expiration of the term of the federation. Opinions differed, however, as to monopolistic or dual control of output and sales, and the Cement Federation was organized for the third time, with the companies affiliated with Onoda as the only outsiders. Since then the Sales Association has become a part of the federation and uniform control of output and sales has been realized.

Committee Formed.—Toward the end of 1934, a committee for improving cement was organized jointly by Government officials and private companies. Members included representatives of cement producers, consumers, a third party and the Commerce and Industry Ministry.

At the time the third association was organized, the number of cement companies was 24, factories 41, capital invested Y.251,253,000, productive capacity 11,000,000 metric tons, actual output 5,160,000 metric tons and exports (except exports to Manchoukuo and the Leased Territory of Kwantung) 440,000 metric tons. In comparison with the figures at the time the second federation was organized, the number of companies had increased by five, factories by eight, capital invested by Y.47,973,000, output capacity by 6,000,000 metric tons, actual output by 1,340,000 metric tons. These figures demonstrate that the



The Chichibu-Bashi has effective spans of 38, 38 and 38 meters, respectively



A three-span bridge, with effective spans of 30, 30 and 30 meters, respectively

output capacity and actual output had made an unbalanced development.

As the organization of the third federation left powerful firms outside, the control itself was threatened unless the Government enforced it. Conscious of this situation, member companies requested the Commerce and Industry Ministry to act, and this brought into being in November 1934, the Major Industry Control Act, the first of the kind in Japan, making control compulsory alike for member and non-member cement companies. This may well be described as an epochal event in the voluntary control of the cement industry. Onoda thus was compelled to accept control at home, but since Chosen and Manchoukuo markets were exempted from control, it made its factories in those territories independent, creating the Onoda Cement Company of Kwantung and the Onoda Cement Company of Manchoukuo.

The public relief works, which materially helped the cement industry, ended in 1935, but the inflation boom continued and sales of cement in Fushun Cement Company (1934), followed by a Harbin factory by the Harbin Cement Company (1935), a Honkeiko factory by the Honkeiko Cement, and a Sento factory by the Manchoukuo Onoda Cement Company. At home, the establishment of new companies and extension of old ones was continuing. Mention may be made of the erection of the Tsuruga factory by the Tsuruga Cement Company, the Takahama factory (Aichi prefecture) by the Tokai Cement Company and the Koharu factory (Fukuoka prefecture) by the Asano Cement Company. In the technical field, the first calcinator was installed by the Nanao and Ube Cement Companies, marking a new era in fuel economy.

The February 26 Incident, in 1936, caused serious repercussions on Japan's politics and economics. The nation moved a step toward the so-called semi-war time footing with this incident as the turning point. In the cement industry, along with the more active Government action, due to the policy of planned economy, the problems pending between the Chosen market and outsiders were satisfactorily solved; the Commerce and Industry Ministry introduced the permit system in order to eliminate the contradictory phases of the increase of the curtailment rate and increase in output capacity. A reduction of the maximum cement price, an agreement on sales regions, and other matters, showing intensive control of cement, was much in evidence. All these contributed a great deal toward stabilizing the cement industry.

In the same year, mixed cement was placed, like Portland cement, under Government control. Mixed cement was produced in Japan for the first time in 1913 when the Yawata Iron Works (the present Yawata factory of the Japan Steel Manufacturing Company) manufactured blast furnace slag cement with slag produced as a by-product of iron manufacturing. The increasing demand for the mixed cement and its exemption from the control, encouraged an increase of the output. The Iwaki, Nippon, Hokoku, Chichibu, Osaka Yogyo, Ube and Asano companies produced mixed cement. In 1936 their total output reached 190,000 metric tons. Then mixed cement was placed under control.

Cement as Ballast.—Following the installation of the calcinator, the Ube Cement Company started building a new 3,500 ton vessel designed to carry cement as ballast. Early in 1936 the ship was launched and was named the *Kyio Tada Maru*. This was the first experiment of this kind in Japan, and may well be called the first in the world, if we except the case of an American cement company, which remodelled an old vessel into a cement tanker. The Ube Company established the Chosen Cement Company at Kaishu, Chosen. Two or three new factories were built by other companies. The Asano Cement of Chosen and the Tohoku Cement Company adopted the grate cooler, a new technical venture. In 1937, Government control over cement was extended to Chosen and Taiwan. Relations with outsiders became cordial and the industry as a whole enjoyed stabilization. The outbreak of the China Incident, in July, however, seriously affected Japan's economics, and the cement industry was not immune from the adverse influence. As the Incident developed, the cement industry began to feel the pinch of rising prices of coal and the shortage of vessels and freight cars, while restriction of the use of iron materials in building work led to a decreased demand for cement. In the meantime, the Osaka Yogyo succeeded in manufacturing alumina cement and began producing cement that would harden in only six hours, by the use of the electric furnace, whereas the same would previously have taken more than four weeks.

With 1938, the dawn of permanent peace in East Asia seemed to be approaching. When the situation in China assumes a more normal aspect the demand for cement will naturally increase. With the hope that the day may not be far off, the writer here concludes his brief survey of the development of the cement industry in Japan, covering a period of 68 years.

Japan's New China Policy

(Continued from page 215)

aim. As arguments indeed such may be quite all right. But Japan in the past always has failed, by the enforcement of such matter-of-fact economy.

Chinese Currency

That the legal tender of the falling Chiang Kai-shek Government is being still maintained, despite Japan's all-front victory in North and Central China, is due to the fact that it has still its specie reserve kept in England and the United States. In other words, this is because England and the United States are still giving aid to the Chinese financial community. Thus for Japan it is necessary, simultaneously with her victory in the hostilities, that she use every possible means to attack this legal tender of the Chiang Government and cause its downfall. Where is the reason to prevent this?

The Japanese on the average are too honest in their dealings. As they leave the Chinese legal tender to take care of itself, they are only underrated or looked down upon by the Chinese or by certain foreign nations. To achieve the end some means or other may well be employed. If Japan had carried out an attack against the Chinese legal tender earlier, China's specie reserve abroad could have been easily converted into the specie reserve abroad of the Bank of Japan, as her war trophy.

Self-Exploitation

In the enforcement of Japan's continental policy, she must not depend on foreign influence, nor must she expect or dream of foreign financial help. She must try to carry it out by her own power. This is the only way to success, I believe. Only when this spirit of self-exploitation is materialized, there will be first seen the phenomenon of foreign capital flowing into our hands. Foreign

capital, in that event, will be compelled to seek its own participation in our enterprise, without our asking for it. It may be impossible perhaps to try to deal with China only with armed force—the China, I mean, which has the history and civilization of four thousand years' duration. But for the time being at least the China situation should be stabilized only by the influence of the Army.

The Singapore Naval Base

(Continued from page 217)

Electrical energy for lighting and power is produced there, and it contains hospital and medical facilities for its resident population, who are being housed under suitable conditions, the Asiatic work-people in permanently constructed lines and the European personnel in residences suited to the climate.

The provision of these residential facilities was necessitated by the geographical position of the Base, it being 15 miles by road from Singapore Town.

Large barrack buildings are also being erected to house the crews of Naval vessels, whilst in dock refitting, thus enabling them to escape the trying conditions to health which would result from remaining on board during these periods, and nearby these shore buildings are ample recreational facilities, such as football and cricket grounds and tennis courts.

So far, the estimated cost of completing the Civil Engineering and Building Works of the Naval Base is £9,735,000, of which about six millions has already been spent. Towards this cost, large contributions have been made by New Zealand, Hongkong, and the Federated Malay States.

Cement Industry in Korea and Manchoukuo*

By Dr. SHOICHIRO NAGAI, Professor at Tokyo Imperial University

THE cement industries of both Korea and Manchoukuo, have in recent years made sound and remarkable progress which is due to the increasing demand for cement occasioned by the recent prosperity of various industries there. As the industries were formerly operated as branch enterprises of the parent firms in Japan Proper exclusive records regarding their capacities and their numerous products have been lacking other recent development, however, have made it necessary to make a separate study of their present conditions and the qualities of their products.

Five cement factories are now operating in Korea, while there was only one several years ago at Heijo, north-east of Seoul. To-day, two other plants with large productive capacities are under construction. In Manchoukuo cement factories have been established in rapid succession since the Manchurian Incident of 1931. Before the incident, there existed only one factory at Dairen, but the number has been increased to eight or nine in the following five years, of late the output and demand of the new State have been mounting to such an extent as to compare favorably with those of Korea.

The total cement capacity of Korea is estimated at 1,800,000 metric tons a year, and it is expected that production will amount annually to 2,000,000 metric tons before long. In Manchoukuo, the current annual production is 1,000,000 metric tons, but it is anticipated that the output will rise to 1,300,000 metric tons after the completion of several new factories. Under such circumstances, therefore, no matter how rapidly the local demand may advance as a natural result of the eventual activity in river improvements, city planning, other engineering projects and other industries will be able to meet mounting requirements.

I.—Cement Industry and Market in Korea

There are three cement companies in Korea—namely: the Onoda Cement Manufacturing Co., Chosen Cement Manufacturing Co., and the Asano Cement Company—operating five factories in all. Another plant is being built by the Onoda interests, while the Chosen Oryokko Hydro-electric Power Company recently was authorized to construct a new factory along the Yalu River. The combined capacities of the five factories are estimated at 1,590,000 metric tons a year, and it is expected to reach 1,950,000 metric tons after the two new plants have been put into operation. The cement firms, with their factories and capacities, are tabulated in Table 1:

The locations of the above factories are shown in the accompanying map No. 1:

The demand for cement in Korea has almost trebled during the past ten years. The local demand in 1928 was 263,000 metric tons dropping in 1931 to 242,000 metric tons, the lowest figure of that period. Since 1931, however, the demand has been increasing yearly. Especially remarkable is the rapid pace with which it has advanced in the past two or three years. Two years ago the

TABLE 1. CEMENT FACTORIES IN KOREA

Firms	Annual Capacity (in metric tons)
(A) Onoda Cement Manufacturing Co. of Chosen	
(1) Heijo Factory	
(2) Sennai Factory	
(3) Komozan Factory	870,000
(4) Sanchoku Factory (under construction)	180,000
(B) Chosen Cement Manufacturing Co.	
(5) Kaishu Factory	540,000
(C) Asano Cement Co. of Chosen	
(6) Mado Factory	180,000
(D) Chosen Oryokko Hydro-Electric Power Co.	
(7) Sakushu Factory (recently licensed)	180,000
Total capacity	1,950,000

demand amounted to 621,000 metric tons and was estimated at 800,000 metric tons for 1937, or three times as large as the 1928 sales. During the current year, it is anticipated, the demand will make another jump to 1,000,000 metric tons. Detailed figures of the local demand, together with the annual capacity, output, exports and imports, are given in Table 2:

TABLE 2. DEMAND FOR CEMENT IN KOREA

Year	Annual Capacity	(in metric ton)			Supply in	Imports	Net Demand
		Output	Exports	Korea			
1928	..	160,000	28,000	132,000	131,000	263,000	
1929	..	278,000	256,000	65,000	191,000	297,000	
1930	..	392,000	246,000	66,000	180,000	288,000	
1931	..	428,000	232,000	61,000	171,000	242,000	
1932	..	430,000	213,000	16,000	196,000	291,000	
1933	..	444,000	248,000	43,000	205,000	343,000	
1934	..	443,000	222,000	48,000	174,000	394,000	
1935	..	563,000	460,000	140,000	320,000	524,000	
1936	..	705,000	567,000	259,000	308,000	621,000	
1937	..	—	—	—	—	800,000	

(Both Exports and Imports include shipments to and from foreign countries and Japan Proper).

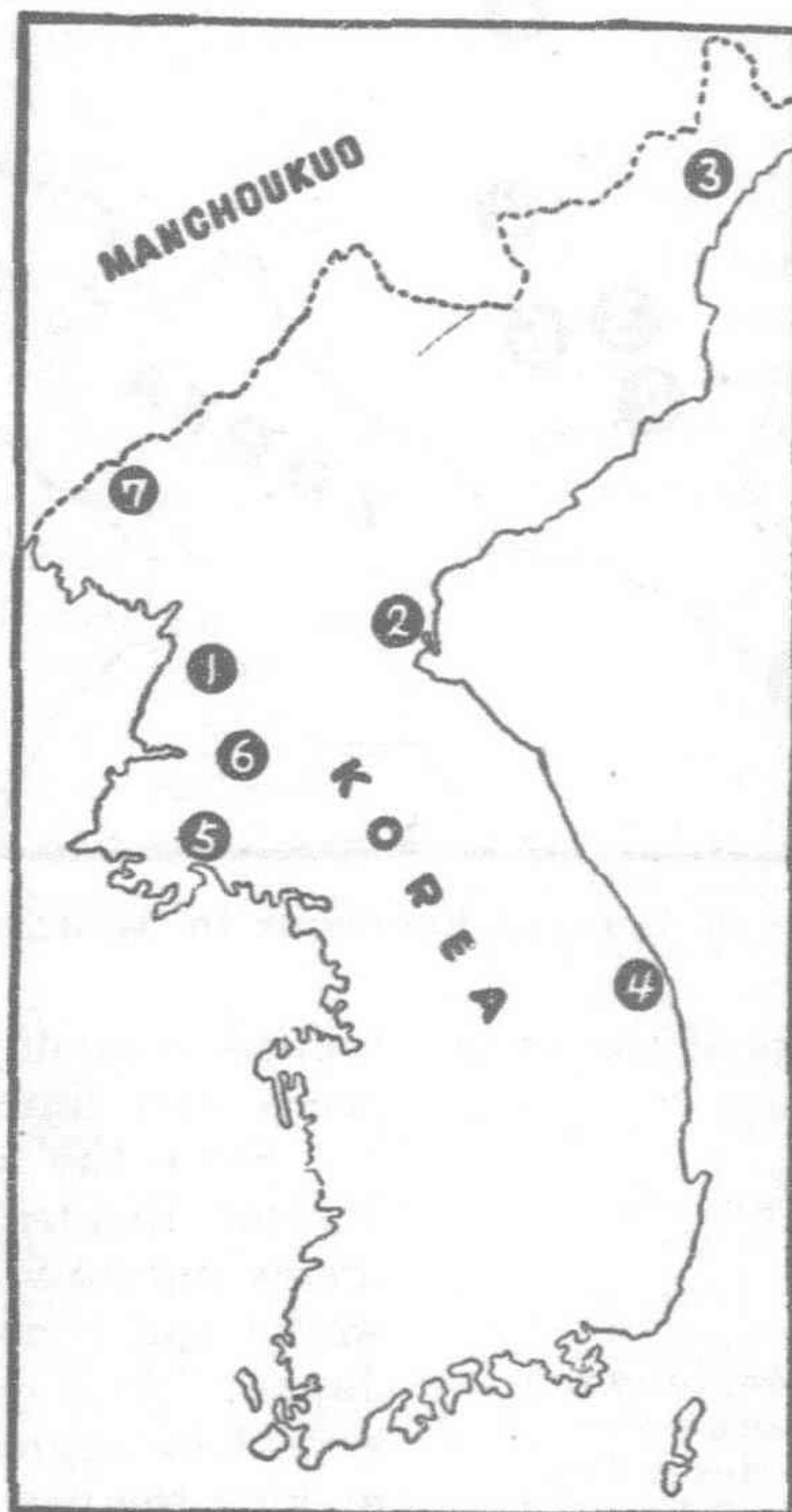
The estimated demand of one million metric tons for 1938 accounts for approximately 63 per cent of the present productive capacity of Korean factories now put at 1,590,000 metric tons. During the 1935-36 period, the actual output in Korea was more than 80 per cent of the total capacity as compared with 60 per cent for Japan Proper. During the early part of last year, however, the output ratio dropped to between 60 and 70 per cent due to the completion of the Kaishu factory of the Chosen Cement Manufacturing Company, which adds 540,000 metric tons to the previous capacity. The industry registered another decline to less than 50 per cent toward the year-end when the Asano interests commenced operating its Mado factory, which has a productive capacity of 180,000 metric tons. At present, the cement companies on the peninsula are enforcing a production curtailment of 63 per cent, working only 37 per cent capacity, while their fellow manufacturers in Japan Proper operating at only 35 per cent capacity.

An examination of the demand in Korea, however, indicates that the situation is not so discouraging there as in Japan Proper. On the peninsula, cement is more heavily needed for railway, road and bridge constructions and other civil engineering enterprises than by the building trade circles and small consumers which constitute the main market for the producers in Japan Proper. Cement consumption classified by their usage in Korea and Japan are compared in Table 3:

TABLE 3. CEMENT CONSUMPTION CLASSIFIED BY USAGE

	Japan Proper				Korea			
	1935 Quantity in 1,000 tons	Ratio in %	1936 Quantity in 1,000 tons	Ratio in %	1935 Quantity in 1,000 tons	Ratio in %	1936 Quantity in 1,000 tons	Ratio in %
Railways	368	7.2	406	7.7	82	15.6	89	14.3
Electric Power	420	8.3	354	6.8	85	16.2	88	14.1
Harbors	136	2.7	139	2.7	5	1.0	12	1.9
Roads and Bridges	370	7.3	378	7.3	53	10.1	60	9.7
Other Civil engineering works	478	9.4	544	10.4	31	5.9	44	7.1
Buildings	1,424	28.0	1,484	28.5	165	31.5	190	30.6
Mining	98	1.9	87	1.7	9	1.7	10	1.6
Retail Sales	1,599	31.5	1,626	31.2	65	12.4	96	15.4
Cement Products	171	3.3	171	3.2	21	4.1	23	4.0
Miscellaneous	20	0.4	27	0.5	8	1.5	9	1.3
Total	5,084	100.0	5,215	100.0	524	100.0	621	100.0

*In The Japan Times.



Locations of Cement Factories in Korea

What is encouraging is the fact that several power stations are now being planned along the frontier between Korea and Manchoukuo, while the enterprising spirit, revived by the Manchurian Incident and the healthy progress which followed is still rising high on the peninsula. In the past several years, the demand for cement has been increasing annually by between 100,000 to 200,000 metric tons. If such rapid pace is maintained for some years to come, the demand will eventually amount to 1,500,000-1,600,000 metric tons before long. In such an eventuality, the present productive capacity of 1,800,000-2,000,000 metric tons a year will prove to be insufficient, and one or two new factories will have to be constructed.

II—Qualities of Cement Produced in Korea

Cement produced in Korea is comparable in quality with that made by the leading firms in Japan Proper, and this is ascribable to the fact that all the cement enterprises there, being operated by sister companies of the Japanese interests, have engaged skilful Japanese engineers and have adopted the efficient technique developed on the main island. Moreover, the cement factories on the peninsula, having been built only recently, are equipped with up-to-date facilities in all cases.

The tests, conducted with the products for 1935 and 1936 in accordance with the prescriptions provided for by Japanese Engineering Standard No. 28, show that an ordinary grade of Portland cement available there not only far surpasses the standard specifications in fineness and compressiveness and tensibility but has such high qualities as can bear comparison with the draft standard specifications of early high strength Portland cement which are expected to be authorized before long. Detailed results of the tests are given in Table 4.

TABLE 4. FINENESS AND STRENGTH OF KOREAN CEMENT

Year	Grade	Fineness		Strength of 1 : 3 Mortar (kg/sq.cm)						
		Residue in %								
		after sieving								
		No. of meshes	per sq. cm.	Compressive Strength			Tensile Strength			
		4,900	10,000	3 days	7 days	28 days	6 days	7 days	28 days	
1935	Ordinary	2.4	8.0	411	531	643	31.9	35.5	42.0	
	Early High Strength	1.2	4.3	551	639	735	39.0	42.5	48.0	
1936	Ordinary	2.5	8.7	388	511	627	32.3	35.9	42.6	
	Early High Strength	2.0	6.5	523	607	718	39.5	43.0	46.0	
	Standard for Ordinary	12	—	150	220	300	—	20	25	
	Standard for Early High Strength	12	—	400	500	600	30	34	38	

In chemical compositions and modulus numbers as well, Korean cement, whether of ordinary or of early high strength grade, can bear comparison with the products in Japan Proper. Moreover, it is claimed to be superior to German cement in many cases. Especially noteworthy is the fact that because its content is considerably low in alumina, magnesia and sulphuric anhydride but very high in silica, Korean cement is particularly impervious to sea-water and accordingly suitable to sea-water works. In this connection, it may be the most excellent in the world. Chemical compositions of Korean cement are tabulated in Table 5.

TABLE 5. CHEMICAL COMPOSITIONS OF KOREAN CEMENT

Grades	Chemical Compositions (%)								Modulus and Index Numbers			
	Ignition loss	Insoluble residue	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	SO ₃	Hydraulic modulus	Silica modulus	Activity index	Iron modulus
1935												
Ordinary	1.59	0.17	22.32	5.33	3.34	64.68	1.26	1.22	2.09	2.57	4.19	1.60
Early High Strength	1.49	0.19	21.47	5.07	3.03	65.85	1.25	1.41	2.23	2.66	4.29	1.64
1936												
Ordinary	1.47	0.20	23.57	5.29	3.28	64.62	1.26	1.17	2.08	2.63	4.27	1.61
Early High Strength	1.48	0.22	21.57	5.35	3.04	65.49	1.13	1.47	2.19	2.57	4.03	1.76



Locations of Cement Factories in Manchoukuo

III.—Cement Industry and Market in Manchoukuo

Prior to the Manchurian Incident of 1931, there existed no cement factory in Manchuria except the cement plant of the Penhsihu Iron Works which produced blast furnace cement for self-consumption by mixing its slag with imported Portland cement at the ratio of 40 per cent. In the Kwantung Leased Territory, however, the Onoda Cement interests were already operating in the vicinity of Dairen a branch factory, which supplied the bulk of its output to Manchuria. Besides, cement was supplied in those days by Japan, North China, Korea and the Coast Province of Soviet Russia. Japanese cement was shipped either by the South Manchuria Railway from Dairen or via the port of Newchwang, and Korean cement by the Antung-Mukden Railway. Russian cement was consumed for the most part in the Harbin district and along River Sungari. From North China cement was supplied by the Peiping-Mukden Railway by a large cement company at Tungshan, Hopei Province. But the total needs were limited in quantity.

Since the founding of Manchoukuo in the wake of the Manchurian Incident, however, the local demand for cement has been increasing rapidly due to the enormous activity of civil engineering works and other industries stimulated by financial support from Japan. As a result, many cement factories have been established, and their aggregate capacity have been expanding to a point of making the new State self-sufficient in cement.

Eight factories were operating at the end of 1937 with the combined annual capacity of 1,010,000 metric tons ; three of them were planning to enlarge their facilities, while the Harbin Cement Company was constructing a new plant at Mutanchiang in North Manchuria. These factories, operators, capacities, expansion plans, and products, are given in Table 6 :

TABLE 6. CEMENT FACTORIES IN MANCHOUKUO

Firms	Factories	Annual Capacity (In Tons)	Expansion Plan (In Tons)	Products
ONODA CEMENT CO. OF KWANGTUNG :				
	(1) Dairen Factory	175,000		Portland cement
	(2) Anshan Factory	125,000		Blast furnace cement
MANCHOU CEMENT CO. :				
	(3) Liaoyang Factory	90,000	90,000	Portland cement
FUSHUN CEMENT CO. :				
	(4) Fushun Factory	(a) 100,000	(b) 50,000	(a) Portland cement (b) High silica mixed Portland cement

<i>Firms Factories</i>	<i>Annual Capacity (In Tons)</i>	<i>Expansion Plan (In Tons)</i>	<i>Products</i>
TATUNG CEMENT CO. :			
(5) Kirin Factory ..	220,000		Portland cement
PENHSIHU CEMENT CO. :			
(6) Penhsihu Factory ..	(a) 100,000	(b) 50,000	(a) Portland cement (b) Blast furnace cement
ONODA CEMENT CO. OF MANCHOU :			
(7) Chuantou Factory ..	100,000		Portland cement
HARBIN CEMENT CO. :			
(8) Harbin Factory ..	100,000		Portland cement
(9) Mutanchiang Factory .		100,000	Portland cement
Total Capacity ..	1,010,000	290,000	

The locations of the above plants are shown in the accompanying map No. 2:

As may be noted in Table 6, the total capacity, estimated at one million metric tons a year at the end of 1937, will be increased to 1,300,000 metric tons after all current expansion plans have been completed. On the other hand, the local output has been gaining with a rapid pace during the past several years; last year it reached 800,000 metric tons—a figure which is considered as large as the home consumption. Inasmuch as the eight factories with the aggregate capacity of 1,010,000 metric tons produced that amount, it follows that they operated only on a 80 per cent capacity basis. This output ratio against capacity is in marked contrast with the corresponding figures for Korea and Japan Proper which ranges from 35 to 37 per cent. One must take into consideration, however, that some factories were obliged to suspend operation during the Winter months from December to March due to severe cold and that the Kirin factory of the Tatung Cement Company was put into operation only last fall with half of its projected capacity. So it can be rightly said that the cement interests in the new State last year while operating their plants worked at capacity.

All of the cement factories in Manchoukuo are producing Portland cement with the exception of the Anshan factory operated by the Onoda organization. Of the three expansion schemes the Fushun factory intends to produce high-silica mixed Portland cement and the Penhsihu factory to make blast furnace cement. After two plans have been completed, the capacity of special mixed Portland cement will amount to 225,000 metric tons a year, accounting for 17 per cent of the total capacity of 1,300,000 metric tons for all kinds of cement. Even in Korea and Japan, special mixed Portland cement output does not comprise such a high ratio.

As has been noted before the demand for cement since the founding of Manchoukuo has been mounting year after year at a rapid rate. In 1933, the year following the establishment of the new state, it was almost trebled to 323,000 metric tons as compared with the previous year. In the following year, it jumped to 527,000 metric tons, and, despite the slight decline in 1935, increased to 624,000 and to 800,000 metric tons respectively in 1936 and 1937. The supply and demand of cement in Manchoukuo,

including the Kwantung Leased Territory and the South Manchuria Railway zone, are recapitulated in Table 7.

TABLE 7. SUPPLY OF AND DEMAND FOR CEMENT IN MANCHOUKUO
(In metric ton)

<i>Year</i>	<i>Output</i>	<i>Imports</i>	<i>Exports</i>	<i>Net demand</i>
1924	103,400	28,400	28,600	96,000
1925	—	26,000	48,600	71,300
1926	—	49,600	64,600	97,000
1927	111,900	69,200	32,900	135,000
1928	151,400	41,900	68,800	129,000
1929	205,700	46,000	80,400	166,000
1930	194,500	46,800	106,100	138,200
1931	162,000	38,900	83,500	109,400
1932	108,800	33,600	35,100	117,900
1933	184,900	155,400	18,400	323,200
1934	232,600	305,400	8,100	527,600
1935	378,000	155,200	11,900	516,500
1936	580,000	167,400	95,100	624,700
1937	800,000*	35,000*	20,000*	800,000*

NOTE :—Figures with asterisks denote approximate quantities.

It is to be noted that the net demand each year is contradictory to the exact figure which is obtained by reducing exports from the total output and imports, such being due to the fact that no figure is available for the demand in the South Manchuria Railway zone and that the statistical figures on the continent are in some cases unreliable.

IV.—Qualities of Cement Produced in Manchoukuo

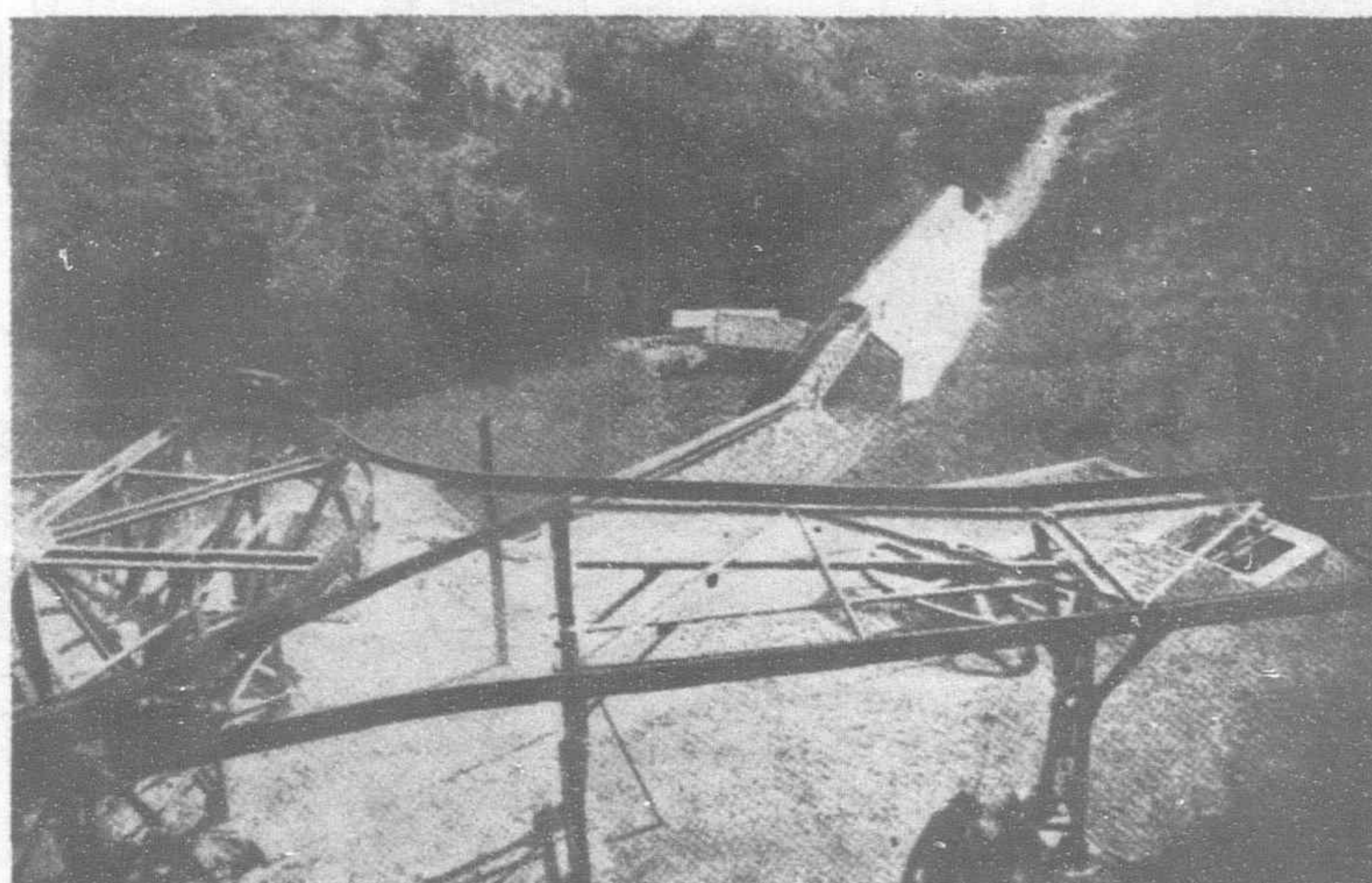
Cement produced in Manchoukuo is not so homogeneous in quality in many cases as that available in Japan and Korea, inasmuch as the bulk of the factories there, established in the past few years, lack technical experience. Its compressive and tensile strengths, however, are far stronger than the standard specifications provided for in JES No. 28 and No. 29 and prove to be comparable with the draft standard specifications of early high strength Portland cement which will formally be authorized before long.

The writer has made physical and chemical tests with the products of all the cement factories in the new State. The average results of his tests, together with those of Kiichi Kuniyoshi are shown in Tables 8 and 9. In the following tables, the capital letters from (A) to (I) each represent the products from different plants, with the first seven being Portland cement and (H) and (I) being blast furnace cement and high-silica mixed Portland cement respectively. The letters marked with the figure (1) indicate the results of the writer's experiments, while those marked with the figure (2) denote Mr. Kuniyoshi's results. Mr. Kuniyoshi is engineer of the Dairen factory of the Onoda Cement Company, and his figures are quoted from the book entitled "Natural Resources and Chemical Industries in Manchoukuo" compiled by the Manchou branch of the Society of Chemistry Industry, Japan,

(Continued on page 228)



The Nishinomiya Baseball Ground on Hanshin Electric Line, Osaka. Cement produced by Toyo Cement Co., Ltd., was used for the stands



Junction of 1.7-mile aerial cableway and 2-mile railway for transporting limestone, Osaka Yogyo Cement Co.

The Yellow River—A Problem to Engineers

R. RAYMOND T. MOYER, agricultural expert from Oberlin-in-Shansi, recently made a trip on behalf of the China International Famine Relief Commission to regions in western Shantung, flooded by the Yellow River in 1935. The purpose of his trip was to study soil conditions with a view to their possible improvement. The journey started at Tsining, and the route covered included Hung Chuan Chi in Pu Hsien at the western end of the flooded area. Thence it turned west through Peng Lou, Shun Cheng Chi, Ma Tsun Chi, ending at Lin Pu Chi. Then it ran eastward in a zigzag path through Tu Ssu Chi, Yao Wang Ssu, Huang Ku An, Wu An Chi, Wang Lao Hu, Tien Chiao, and finally ended at Chu Yeh. As a result of his investigations, Mr. Moyer grouped the different kinds of soil under observation into three types. The classification was based upon differentiation with respect to the nature of the soil, to its value for agricultural purposes, and to the kind of treatment which would be required to bring the land back to the state of maximum productiveness.

The three types of soil are summarized by Mr. Moyer in the following table:

Type of soil condition	General characteristics	Area in square miles	Percentage in total area
Type I	Surface soil either silt, sand or loam. Subsoil of similar materials in layers. Injury due to sand deposits not great.	168	42.4%
Type II	Surface of fine sand or fine sandy loam. Subsoil in layers of fine sand, loam, or silt, sands and loams predominating. Tillable but reduced in value.	162	41.0%
Type III	Surface and subsoil of fine sand or light fine sandy loam. Scarcely tillable and much reduced in value.	66	16.6%

On the basis of these findings, Mr. Moyer made the following recommendations for the improvement of the above three types of soil with a view to making it permanently fit for field crops.—*Editor.*

in a small way or not at all. These, it is suggested, should be introduced on a trial basis, and those that prove to have sufficient merit recommended later for wide use. Old and new practices believed to deserve attention are as follows:

(1) *Good Plowing and Harrowing of Silts and Loams.*—Good plowing and harrowing of Type I soils, and many of Type II, will result in a breaking up, on the surface horizon, of the present layered structure and a mixing of the materials which will cause a general improvement. Indeed, little else in the way of special treatment is needed for soils of Type I, which can be cropped about as formerly.

(2) *Turning.*—Following the flood of sixty years ago, considerable improvement was brought about by bringing to the surface silt and loam material buried under surface layers of sand. In many places, particularly in Type II conditions, this is again possible; and its practice will result in restoring such fields to approximately their former state of productiveness. Farmers have already begun this difficult work, and all encouragement should be given to their efforts.

(3) *Plant Cotton on Light Sandy Loam Soils Where Wheat Fails.*—On many light sandy loam soils, winter wheat will probably not be grown profitably, if at all, due to sand blowing and an inadequate supply of moisture in winter and early spring. On this land, farmers will naturally think of peanuts and sweet potatoes, which in many cases may be the best crops to grow. Cotton, however, is a crop which, from all observations, should be well adapted. The soils of the important cotton raising district at Tinghsien, Hopei, are of this type. And many important cotton soils of the southern United States are also sandy. Cotton, therefore, is strongly recommended for thorough trial on the light sandy loam soils which may not be suitable for the two crop per year system formerly followed at these places.

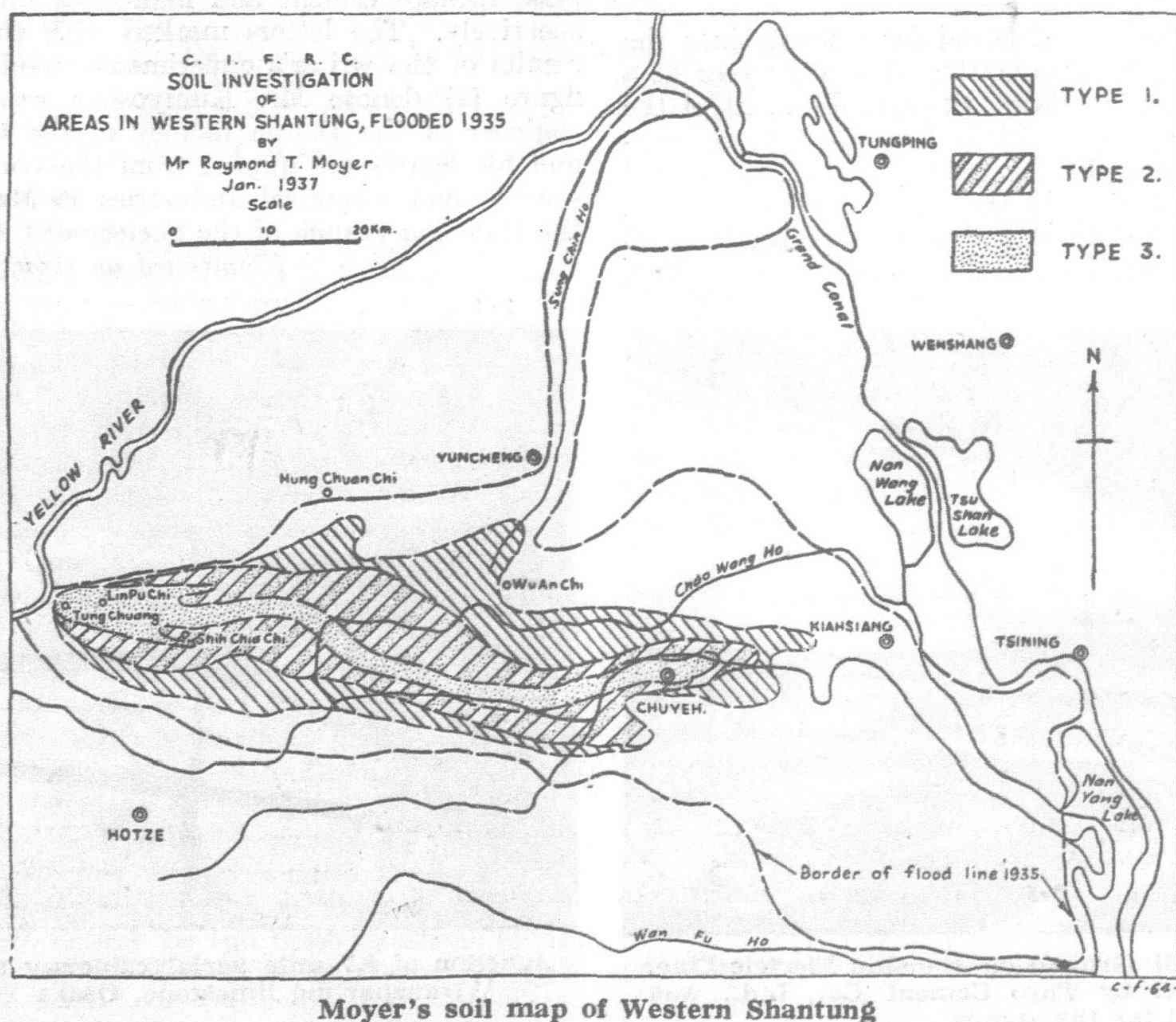
(4) *Plant Willows and "Pei Lien T'iao" for Twigs on Sandy Slopes, Gullies, and River Beds.*—The worst sandy areas in Type III soils at the present time cannot produce even a low yield of field crops. If these are immediately planted with willow or some similar plant for basket-making twigs, a certain amount of income can be gotten. This should be undertaken at once on a large scale, utilizing the thousands of seedlings that have sprung up nearly everywhere in the flooded region. It is not recommended, however,

that a similar use be made of the level sandy areas, as low growing trees thickly planted will act as a windbreak which will pile up the sand and render that location permanently unfitted for field crops.

(5) *Plant Alfalfa on Marginal Land.*—Some of the land which contains a small amount of loamy material produced this fall a stunted growth of bean plants without grain. This soil at the present time probably does not contain enough nutrient material for ordinary field crops, but it is too good for only willows; and, if properly handled, it should in a comparatively short time be suitable for certain ordinary field crops. In order to hasten this process, and at the same time to make a maximum present use of it,

Recommendations

There is no simple short-cut agricultural method for transforming sands immediately into highly productive farm land. Agriculturists must begin by accepting soil conditions as they are and follow methods which, on the one hand, will make a maximum utilization of present soil resources and which, on the other, will gradually bring the soil into a state of greater productiveness. Some useful methods for accomplishing this are already known locally in this region. These should be given the greatest possible encouragement. In addition, there are other methods believed to be useful but which have so far been tried only



Moyer's soil map of Western Shantung

the growing of alfalfa is recommended. Its long roots will reach to the water table for moisture, and it prepares its own nitrogen. Its roots, also, will bind the soil and add organic matter, while the nitrates they leave will be beneficial to other crops planted the year or two succeeding. The young shoots of the crop itself are an edible human food, and the dried hay is a good work animal fodder, and one of the best known feeds for sheep which are common in this region. Composted, it would form an excellent manure. A thorough trial should be given this crop, planting it in the late spring or early summer as soon as rains are sufficient to insure germination and carry the young plants along. If successful, it could become an important factor in building up marginal soils and of possible permanent value in the rotation.

(6) *Plant Willows, Elms, and Poplar for Fuel and Timber, and Jujube, Peach and Pear for Fruit, on Level Sandy Areas.*—As already stated, it is not recommended that level sandy areas be at once planted to a thick stand of low trees, like willows for twigs, lest sand pile up on those spots making them permanently unsuited to the cultivation of crops. Trees for timber and fruit, planted not too thickly, will make some utilization of this land and hold it against blowing. Eventually, some of this land may gradually become usable for certain field crops, while others will have to be devoted permanently to the growing of timber or fruit trees.

(7) *Ammonium Sulphate Fertilizers.*—Fertilizing material of all kinds will be very beneficial, particularly organic manures which will have special benefits to the soil, reducing the blowing and the loss of moisture by evaporation. The fertilizer supply from this source, however, will not be adequate, and to meet this need for fertilizers, a trial of commercial fertilizers is recommended, particularly ammonium sulphate. While this, because of practical considerations, may not be the first thing to urge in the present situation, it is strongly recommended for trial at an early date. (Note: Fertilizer experiments at Tinghsien, Hopei, have shown that, for cotton on similar soils, both ammonium sulphate and superphosphates produced significant increases in yield. If fertilizer experiments are to be conducted on these sandy soils, it would be well to experiment with both of these materials).

Note Regarding Digging of Wells.—One problem of sandy soils is moisture supply. To meet this problem, the use of irrigation water from wells would seem to offer a solution. This water, however, contains high percentages of salts, and wells for irrigation are, therefore, not recommended before chemical tests of this water are made to determine the kind and concentration of the salts which the water contains. It is possible that a continued use of this water would soon produce a saline or alkaline condition, under which crops would not grow at all.

"China's Sorrow"

The great expense in maintaining the Yellow River dykes and its constant menace, was described in the magazine *Oriental Affairs*, April, 1938. The article pointed out:

The Yellow River, the banks of which between Tungkwan, on the Honan-Shansi-Shensi borders and Kaifeng, the Capital of Honan, have been the scenes of such intense fighting between the Japanese and the Chinese Armies, is not without reason known as "China's Sorrow." It is not as turbulent as the Yangtze, when in flood, its maximum flow being only some 20,000 to 25,000 cubic meters per second, against the Yangtze's 70,000 to 80,000. Its unmanageability is attributable to the fact that at flood periods the amount of sediment carried assumes incredible proportions, tending to choke the channel in the lower reaches until the flow goes over the dykes. There is probably no other great waterway

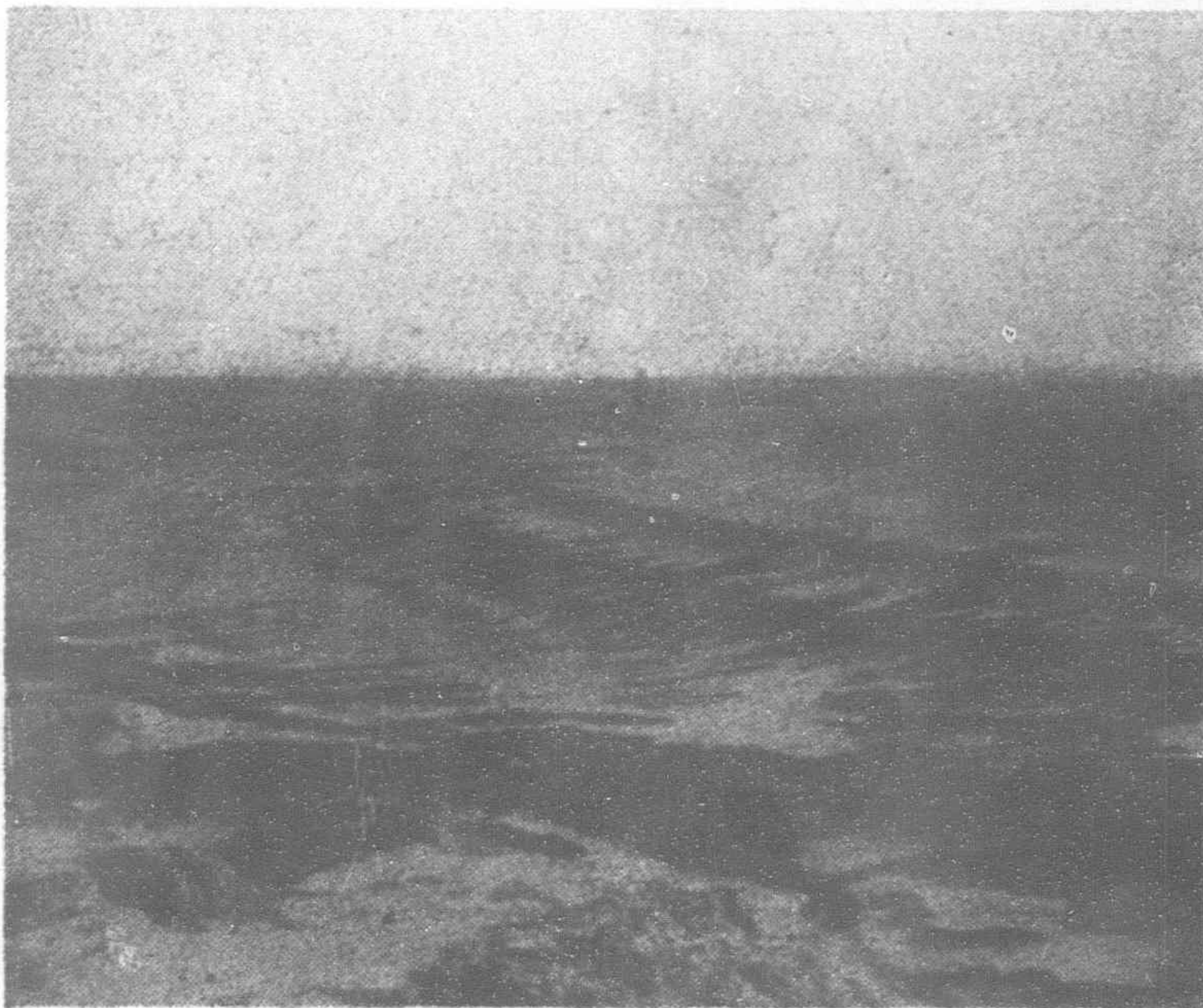
in the world which causes geological changes so rapid that they can be distinctly measured within a decade. Every time a dyke is breached large tracts of land are silted up to a depth of five to eight feet or more, and before the channel can be forced back into its course, the livelihood of hundreds of thousands, if not millions of the population is affected. The mouth of the Hwang Ho has at various historical periods been located near Tientsin, in the Yangtze near Chinkiang, and at Haichow, in Northern Kiangsu. Its last dramatic change of course occurred in 1853 when it suddenly changed its outlet from the Haichow region to the Gulf of Chihli, a distance, as the crow flies, of about 250 miles. An upheaval of this magnitude, involving the selection by the river of an entirely new course from Kaifeng to the sea, a distance of some 400 miles, could not, of course, occur without appalling loss of life and property. Nor did the trouble end there. In finding the new outlet the river badly damaged the historic Grand Canal, and as it continued to carry down millions of cubic meters of sediment, it had to be dyked in anew to ensure that it would remain in its new channel—a task which occupied several years. Before reasonable security was felt monster dykes had to be constructed sufficiently far apart to provide a flood channel. On several occasions since, however, the river has burst its bonds, and overflowed towards the Yangtze, or disturbed the regime of the Hwai river. The silt which presents such a grave problem in times of flood consists mainly of the loess, which occurs in the middle portion of the watershed.

The conservancy of the Yellow River has formed the subject of investigations by a number of Foreign Engineers since 1888. The cost of any radical scheme for the permanent improvement of the waterway, however, would be prohibitive. Millions of dollars have been spent upon repairing and strengthening the dykes in times of emergency, but these are only palliative measures, the expense for which is recurring, and it has only been by constant watchfulness and the development of a special technique for the rapid closing up of breaches, that the river has been kept to its present course. In the past these palliative measures were left to the Provincial authorities, but major breaches of the dykes in Hopei in 1933 and 1934, and in Shantung, in 1935, led the Government to transfer the responsibility for coping with the Yellow River

problem to a Yellow River Commission and the National Economic Council. Under the supervision of these bodies the danger spots were repaired or reconstructed, at a cost of many millions of dollars, and by the end of 1936 it was reported that dyke construction or repair had removed immediate danger of serious floods. Safety, however, can only be ensured by unremitting vigilance. The Yellow River Commission, which has its head office at Kaifeng, from the middle of June to the end of October, receives reports of the state of the river at numerous points, thrice daily. At the first sign of danger all possible precautions are adopted. The dykes are kept under constant supervision, and any apparent weaknesses are dealt with immediately.

Main Danger Area

The main danger area is about 750,000 square kilometers in extent, and the population whose livelihood is at stake must be between 50 and 70 millions. Considerable anxiety is now being felt as to the outlook for these people during the coming summer. Not only has it been reported that for military reasons certain of the dykes have been breached by the Chinese. It is obvious that neither the National Economic Council, nor the Yellow River Commission will be in a position to function before the flood danger becomes acute. With armies battling fiercely in the danger zone it cannot be expected that the precautions which have been adopted



Sandy stream bed left by flood waters of 1935

during the past four or five years, including the recording of water-levels, and the systematic inspection of dykes, will continue to be observed. Not without reason is it feared that the calamity of war will be aggravated by a natural calamity of appalling dimensions. Large portions of Hopei (including the Tientsin plain), Shantung, and Honan, must be considered to be in pawn to the Hwang Ho. Moreover, a change of course, either towards Haichow, or towards the Yangtze Valley, would imperil extensive areas in Kiangsu and Anhwei Provinces. And while hostilities continue in the Yellow River basin, there can be no hope of effective counter-measures being taken to avert a potential catastrophe of unprecedented gravity. If co-ordinated local efforts, supplemented by grants



Soil material of sandy loam and silt, showing Type I conditions

and technical direction from the Central Government are necessary to cope with the flood danger, the outlook when even local initiative must be lacking, must be regarded as black, indeed. Even if one assumes that before the onset of the summer floods the Japanese have occupied both banks of the river from Tungkwan to the sea, they are likely to be far too preoccupied with other matters effectively to tackle a problem of such magnitude.

One can, indeed, only hope that, during the approaching summer nature will show herself more merciful than man, and so distribute the rainfall that the usual summer floods will be avoided. That appears to offer the only reasonable prospect of averting a loss of life and property beside which that caused by hostilities in the Hwang Ho basin would appear a mere bagatelle.

Tsingtao Mills Repaired

Repair work on the Japanese spinning mills in Tsingtao which were heavily damaged by fire started by the Chinese troops before their withdrawal from this city, is proceeding rapidly. The mill owners, with the intention of reopening operations as early as possible in order to contribute to the economic revival of Tsingtao and to provide for the livelihood of their employees have made arrangements with the early return of the latter to Tsingtao.

Cement Industry in Korea and Manchoukuo

(Continued from page 225)

and published by the Maruzen Company, Ltd. Since both tests are conducted in accordance with the prescriptions in JES No. 28 and No. 29, the figures in the tables can compare on the same basis with the qualities of Korean and Japanese cement as pointed out in the early part of this article.

Table 8 shows the specific gravity, fineness, initial and final setting times, and the comparative compressive and tensile strengths :

TABLE 8. PHYSICAL PROPERTIES OF MANCHU CEMENT

Pro- duct	Specific gravity	Fineness % of Residue			Strength of 1 : 3 Mortar (kg/sq.cm.)			Strength of 1 : 3 Mortar (kg/sq.cm.)		
		No. of Meshes per sq. cm.	Setting Times		Compressive Strength			Tensile Strength		
			Vicat Needle		—Age at Test—			—Age at Test—		
			Initial	Final	3 days	7 days	28 days	3 days	7 days	28 days
A-1	3.16	1.8	3-20	4-55	404	537	653	31.2	34.5	39.7
A-2	3.175	1.5	—	—	425	538	652	33.8	36.6	43.1
B-1	3.16	2.7	2-24	3-45	430	536	597	31.7	35.2	39.2
B-2	3.150	2.6	—	—	435	533	591	32.1	34.9	39.5
C-1	3.13	3.5	3-14	5-1	378	467	570	33.4	37.0	41.8
C-2	3.155	2.4	—	—	371	460	517	34.4	36.3	42.4
D-1	3.16	3.5	2-28	3-57	444	559	669	33.6	37.2	41.3
D-2	3.176	3.0	—	—	424	565	658	33.8	36.4	41.9
E-1	3.14	2.6	2-43	4-22	422	542	656	32.2	37.0	42.7
E-2	3.165	2.0	—	—	403	580	678	31.6	36.1	44.1
F-1	3.15	3.1	3-9	4-30	372	515	653	30.3	33.5	38.8
F-2	3.170	2.6	—	—	447	545	664	33.0	35.2	41.8
G-1	3.14	2.9	3-20	4-59	374	487	595	31.2	34.2	39.9
G-2	3.170	2.0	—	—	380	480	600	32.0	36.0	41.0
H-1	3.04	1.5	3-10	4-49	316	427	625	28.5	33.0	42.5
H-2	3.054	1.3	—	—	329	445	638	27.7	32.8	45.0
I-1	2.94	3.4	2-52	5-11	419	496	623	32.7	35.3	41.9
I-2	2.872	2.6	—	—	407	491	599	32.2	33.8	40.6

As may be noted in Table 9 which denotes the chemical compositions in per cent, modulus numbers and activity index, cement produced in Manchoukuo is not inferior to that produced in Korea and Japan. In the case of (C) cement, however, the content is considerably low in silica and high in alumina. Such low-silica, high-alumina cement is very rare not only in Japan but also in the world. Accordingly, the silica modulus and activity index are lower and the iron modulus is larger than those for other products. This is because this cement is made exclusively from limestone and oil shale and does not contain any high-silica clay. Since blast furnace cement (H) and high-silica mixed Portland cement (I) cannot compare with Portland cement in modulus numbers and activity indices, the corresponding figures for these two products are omitted from Table 9.

TABLE 9. CHEMICAL COMPOSITIONS OF MANCHU CEMENT

Products	Chemical Composition (%)								Modulus and Index			
	Ignition Loss	Insoluble Residue	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	SO ₃	Hydraulic Modulus	Silica Modulus	Activity Index	Iron Modulus
A-1	1.13	0.15	22.65	5.27	3.15	65.01	1.33	1.09	2.09	2.68	4.30	1.68
A-2	0.79	0.12	22.98	5.13	3.13	65.54	1.21	1.05	2.10	2.78	4.48	1.64
B-1	1.54	0.32	21.42	5.63	2.76	64.04	2.90	1.38	2.16	2.54	3.78	2.06
B-2	0.87	0.34	21.35	5.82	2.98	64.87	1.98	1.47	2.13	2.43	3.67	1.95
C-1	1.19	0.36	19.70	8.10	3.46	54.05	1.63	1.38	2.03	1.71	2.41	2.37
C-2	1.18	0.30	19.70	7.73	3.48	64.11	1.69	1.68	2.07	1.76	2.55	2.22
D-1	1.05	0.38	22.29	5.96	2.97	64.15	1.60	1.36	2.05	2.50	3.75	2.01
D-2	0.55	0.40	22.33	5.90	2.94	64.53	1.68	1.42	2.04	2.53	3.79	2.01
E-1	1.41	0.22	22.80	5.15	2.85	64.98	1.32	1.16	2.12	2.89	4.52	1.81
E-2	1.02	0.15	22.56	5.08	3.24	65.62	1.21	1.12	2.13	2.71	4.44	1.57
F-1	1.00	0.15	23.92	4.49	2.61	65.54	1.01	1.01	2.10	3.41	5.38	1.72
F-2	0.53	0.30	23.75	4.78	2.62	65.66	0.83	1.22	2.08	3.21	4.97	1.83
G-1	1.49	0.36	22.08	5.86	3.15	64.60	1.05	1.10	2.07	2.45	3.79	1.87
G-2	1.10	0.30	21.90	5.80	3.30	65.30	0.95	1.05	2.11	2.41	3.78	1.76
H-1	0.76	0.14	30.28	6.44	2.34	56.71	2.10	0.96	—	—	—	—
H-2	0.51	0.12	30.47	6.79	2.21	56.71	2.14	0.93	—	—	—	—
I-1	1.57	17.49 (1)	34.35	7.48	3.03	50.24	1.47	1.54	—	—	—	—
I-2	1.85	14.84 (2)	27.34	12.22	3.68	51.36	1.60	1.68	—	—	—	—

The Philippines—Its Unique History

By GREGORIO F. ZAIDE, PH.D.*

THE history of the Philippines is a unique story of changing civilizations and sweeping fates etched by time against the glamorous background of a changeless East. It is a vast tale of a tiny archipelago-nation, fraught with episodes of high adventure and sacrificial heroism, spiced with sagaci romance and epic wars, and climaxed with cultural achievements and civilizational progress. Chanted by rhapsodists and recounted by historians, it is of unfailing interest, for it has the aroma of a dance, the charm of a song, and the swing of a symphony.

Birth of the Filipino People.—Beyond the horizon of history, about 25,000 years ago by the ethnologists' calendar, the Philippines was a *terra incognita* to human knowledge, an unchronicled land veiled in the mists of oblivion. Possibly during that age, according to many enterprising scientists, the archipelago was connected with Asia. It was the epoch that witnessed the landward migration of the dwarfish, dark-skinned Negritos from their ancestral homes in central Asia to the Philippines. These Negritos, possessing primitive weapons and a paleolithic culture, became the aboriginal inhabitants of the land.

Some 8,000 years ago, the second immigrant race called Indonesians (Island Indians), a tall, maritime people of southern Asia with admixture of Mongoloid and Caucasian bloods, crashed through the floodgates of the islands. That was the time when the land-bridges linking Asia and the Philippines were already submerged beneath the seas. The Indonesians came in boats, hence they were said to be the first sea-immigrants to reach Philippine shores.

From 200 B.C. to the 15th century the third prehistoric race of immigrants peopled the islands. They were the brown Malays of southeastern Asia. Like the Indonesians, they were a sea-roving race and they arrived in the archipelago in their swift-sailing, outrigger boats. Oriental scholars called them the "Phœnicians of the East" because of their Homeric voyages of discovery throughout the Pacific and Indian Oceans long before the birth of Prince Henry the Navigator, Columbus, Balboa, Magellan, and other European geographical heroes.

The three races met in the Philippines and clashed for supremacy. Out of their unrecorded racial wars, the Malays emerged victorious by virtue of their superior arms and culture. Their contact led to interracial marriages and racial amalgamation, ultimately giving rise to a new hybrid race—prehistoric Filipinos. In subsequent times, the people received blood infiltrations from the Hindus, the Chinese, the Japanese, the Arabs, the Spaniards, the Americans, the English, the French, the Germans, and other Occidental nationalities. Hence, the Filipinos of to-day, like the neo-Hawaiians, possess the bloods of both Orient and Occident.

Pre-Spanish Philippine Relations.—Prior to the advent of Spain in 1521, the Philippines had political, cultural, and commercial relations with India, China, Japan, Arabia, Siam, Indo-China, Malay Peninsula, Borneo, Sumatra, Java, and other eastern lands.

During the early centuries of the Christian Era, the Pallava rulers of India established a mighty colonial empire throughout Malaysia. It was then that the Malay people embraced the religions and civilization of Vedic India. Over the ruins of this Indian ultramarine empire rose two great Hindu-Malay states—the Shri-Visaya Empire (8th century A.D. to A.D. 1377) and the Majdaphit Empire (1377 to A.D. 1478). The Philippines was a tributary of these Hindu-Malay empires. Historians declare that the Filipinos felt the impact of Hindu civilization during the heyday of the Pallava power and, later, during the existence of the Shri-Visaya and Majdaphit empires.

Relations with China

Malaysian chronicles and archæology relate that the Majdaphit empire collapsed in A.D. 1478, and was succeeded by the Malaccan Empire, a Mohammedan-Malay state that flourished until the 16th

century when it was overthrown by Portugal and Spain. Islam and Arabic civilization reached the Philippines during the dominance of this empire.

Philippine relations with China dated historically as early as A.D. 982 as evidenced by an old Cantonese document. Two ancient Chinese writers, Chao Ju-kua (1209-1214) and Wang Ta-yuan (1349) recorded that the trade junks of Old Cathay sailed the Philippine seas for purposes of commerce. The early Sino-Philippine relations were not purely economic in character, but also political and cultural. The *Ming-shih*, annals of the Ming dynasty (1368-1644), recorded that the Philippines was an adjunct of the Chinese Empire and that the Filipinos paid tribute to Emperors Hung-wu and Yung-lo from 1372 to 1421. In the course of the Sino-Philippine contact, the Filipinos received the civilizational influences of China.

Historians are in a quandary in fixing the beginning of Philippine-Japan relations. One of the Japanese ancient chronicles, *Nihon Shoki*, related the shipwreck of a vessel from the country of Tokwara at Kyushu in A.D. 654 during the reign of Emperor Kotoku. If Tokwara was the

Philippines, as modern Japanese writers claim, then Philippine contact with Japan may be said to be relatively old. More reliable and definite than the above citation is our knowledge of the pre-Spanish Philippine trade with Nagasaki merchants. Several Japanese pirate adventurers were said to have invaded the Philippines.

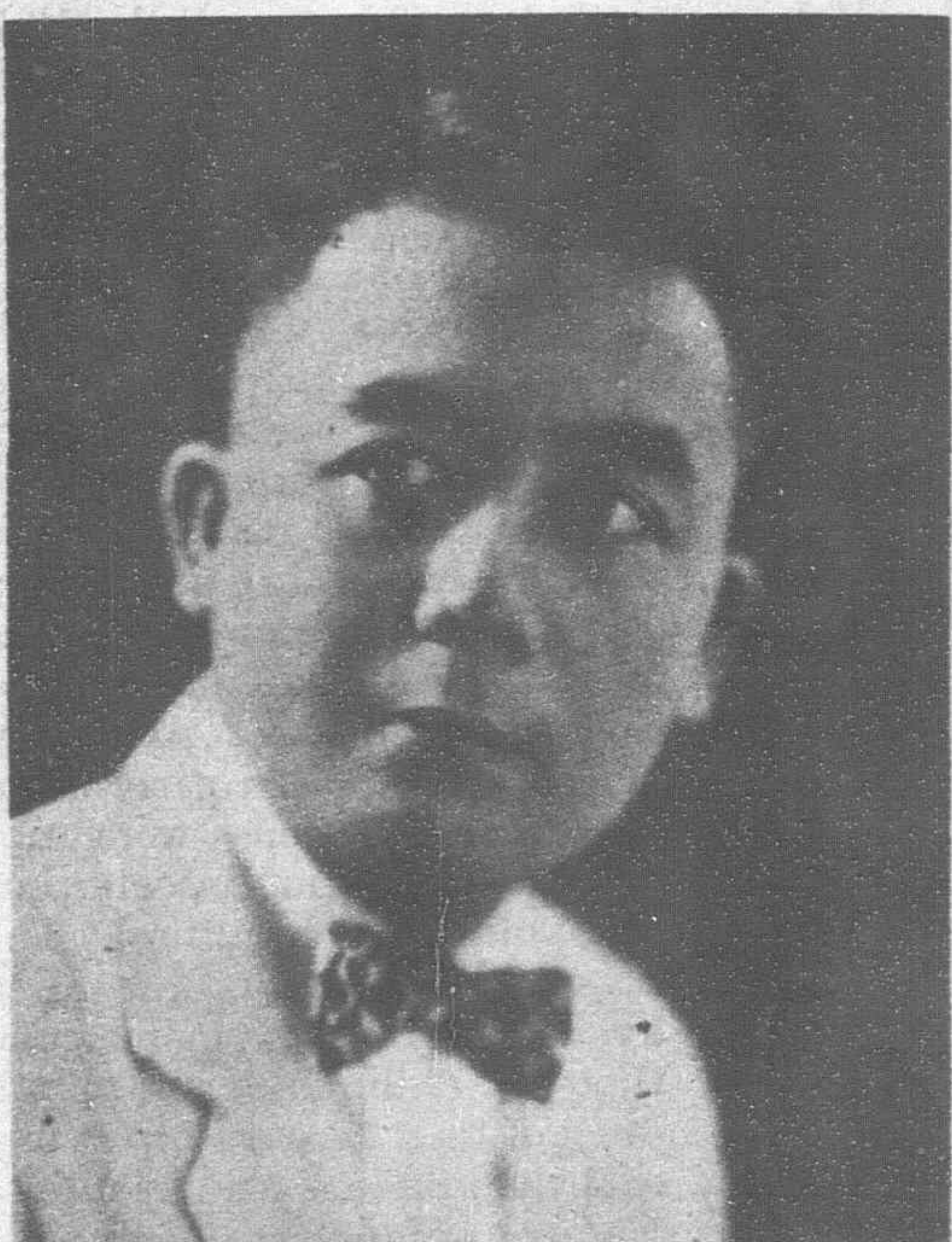
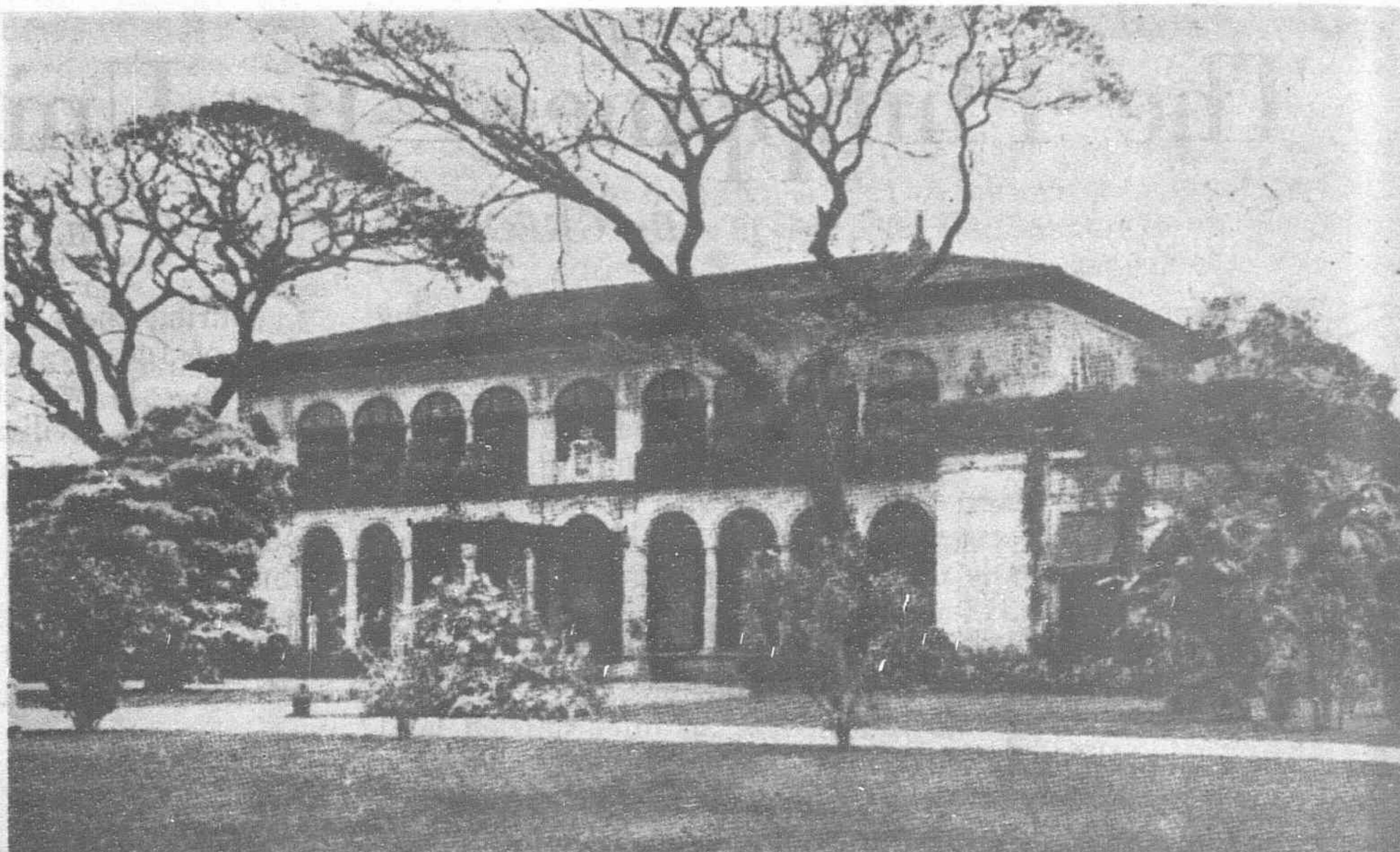
With the Malay Peninsula, Siam, Indo-China, Borneo, Sumatra, Java, and other Oriental lands, the ancient Filipinos carried on commercial relations. The seas of Malaysia in early pre-European times were Malay lakes where Malay mariners and traders sailed in quest of profit and adventure.

* Dr. Zaide is professor of history and political science in the Far Eastern University of Manila and the first visiting Filipino professor in the University of Hawaii, 1937-38, where he conducted a lecture course on "The Commonwealth of the Philippines." This article which appeared in *Pan-Pacific*, is a humanized synopsis of one of his documented lectures.



Manuel L. Quezon, President of the Philippine Commonwealth

Royal Studio, Baguio, P.I.



The Executive Building and Malacanan Palace, home of President Manuel L. Quezon, and some of his associates: (upper left) Hon. Elpidio Quirino, Secretary of the Interior; Hon. Jorge B. Vargas, Secretary to President Quezon, and known as the "Little President"; (left) Hon. Gil Montilla, Speaker, National Assembly; Chief Justice Ramon Avancena of the Supreme Court of the Philippines; Hon. Quintin Paredes, Resident Commissioner to the United States, Washington, D.C.

The Advent of Spain and Christianity.—The curtain of a new historical era rose over the Philippines on March 16, 1521, when the Spanish caravels, led by Magellan, Portuguese sea-captain in Spain's service, rediscovered the archipelago for Europe. Like the ill-fated Captain Cook of Hawaiian history fame, he was slain on the land he rediscovered during a hectic skirmish with the inhabitants. His conqueror, Lapulapu, fearless king of Mactan island, was rightly acclaimed as the first hero of the Filipino race.

After the Magellanic expedition, Spain dispatched other expeditions to conquer and colonize the islands, as follows: Loaisa's expedition (1525-26); Saavedra's expedition (1527-28); Villalobos' expedition (1542-43); and Legaspi's expedition (1564-65). The last named expedition succeeded in laying the foundation of Spanish colonization.

History depicts in bold strokes the conquest of the Philippines by sword and cross. Dashing Spanish cavaliers and intrepid Catholic missionaries marched through the islands, the former subduing the Filipinos for the king by the brutal might of the sword, whilst the latter won them for God by the magic charm of the cross. But it must be noted, however, that not all Filipinos were completely subjugated by Spain. The Moros of Mindanao and Sulu, Islamite sea-dogs of eastern seas, and the hill tribes of the archipelago defied Spanish power successfully for over 300 years.

Spanish Rule Menaced by Foreign Nations.—Foreign nations bitterly contested Spain's hold over the Philippines. Wars were fought against the Portuguese (1566-70), the Dutch (1600-1848), and the English (1762-64). England was the only European power to capture and occupy Manila, but she returned the city to Spain by virtue of the Treaty of Paris of 1763.

Chinese Pirates

Asia's "yellow peril" frightened also the Spanish colonizers. In 1574, an audacious Chinese pirate-king named Limahong attacked Manila. He was decisively repulsed by both Spaniards and Filipinos who fought together under the brilliant leadership of Salcedo, Legaspi's famed grandson. In later years—1603, 1639, 1662, 1686, and 1763—the Chinese residents in the Philippines rose in bloody revolts against Spanish rule, but they were crushed with frightful losses in men and treasures.

Japan too attempted to dislodge Spain from the Orient. As early as 1582 a Japanese kingdom was in the making in Northern Luzon under Zaifusa. This kingdom was, however, destroyed by a Spanish force under Captain Carrion. In the years 1591 and 1593 Hideyoshi, Japanese tycoon, demanded the vassalage of the Spanish authorities in Manila. The Spaniards temporarily placated his designs. The incident of a shipwrecked Spanish galleon on Japan's coast, whose pilot boasted that Spain aimed to conquer the world under the guise of religious propaganda, impelled Hideyoshi in 1596 to renew his plan of expelling Spain from the Philippines. Actual preparations for invasion were made; Hideyoshi, however, died in 1598. Other Japanese daimyos tried unsuccessfully to carry on his dream. Had the Japanese swooped down on the archipelago during that age, they could have conquered it.

Moro Wars and Filipino Revolts.—The greatest peril to Spanish sovereignty came from the Filipinos. From the beginning to the end of the Castilian regime, the Moros (Mohammedan Filipinos) viciously resisted the southward thrust of Spanish imperialism. In defiance of Spain's flag and of Christ's cross, they harried the whole archipelago with fire and sword, burning and pillaging Christian towns and churches, killing and enslaving the Christian Filipinos and Spaniards, and raiding and attacking the wharves of Manila in plain sight of Spanish cannons. So nightmarish were the horrors and tragedies of the Moro wars that one Spanish historian wrote that their history was written in blood.

The Christian Filipinos never gave up their old dream of freedom. Goaded from time to time by Spanish abuses and corruptions, they rose in over 100 revolts which failed, unfortunately, for lack of unity and national leaders. Thousands of Filipinos lost their lives in these regional uprisings, but the cause for which they had heroically fought lived on. And now a laurel of immortality is placed over their graves with Horace's deathless quotation: "*Dulce et decorum est pro patria mori.*"

Spanish Contributions to the Filipinos.—For over 300 years, Spain influenced the Filipinos "profoundly and on the whole for the better." She uplifted them from the abysmal depths of paganism to the noble heights of Christianity. It is certainly due

to her that the Filipino people became "the only Christian nation in the Far East."

Spain brought Latin civilization to the islands. Under her tutelage, the Filipinos learned the morality and ethics, the educational ideologies, the arts and sciences, the literature and music, and other cultural legacies of Renaissance Europe.

To Spain also belongs the glory of having introduced to the Philippines new plants and animals, the Latin alphabet, the first printing presses and libraries, the first schools and universities, the earliest hospitals and charitable institutions, the first banks and railroads, the first roads and bridges, the first telephone, cable, telegraph, and other means of communication.

Lastly, Spain paved the way to the florescence of Filipino unity. She destroyed the early warring independent tribal states (*barangays*), and imposed over all Filipinos a national government under Spanish monarchy. She gave them a common religion (Christianity), a common civilization (Latin), and a common language (Spanish) which drew the diverse tribes closer together. And by grinding these tribes beneath her despotic heel, she unwittingly aroused their nationalism because of their common grievances against alien tyranny.

The Philippine Revolution of 1896.—Spain's marvelous record as a Christian colonizer was, regrettably, marred by the abuses and corruptions of her officialdom and by the retrogressive, medievalistic policy of her ministry so that the Filipino people, despite the blessings they got from Christianity and Latin civilization, were discontented, miserable, and unhappy.

Spanish Persecution

Following the tragic execution in 1872 of the three Filipino priest-martyrs, Fathers Burgos, Gomez, and Zamora, a group of young Filipinos came to the fore and crusaded for reforms. They were called propagandists because they voiced the laments of their down-trodden race by means of their eloquent tongues and trenchant pens. Many of them won undying fame in history, notably Dr. Rizal, greatest Filipino genius and novelist; Plaridel, fearless lawyer-newspaperman; Lopez Jaena, fiery orator; Juan Luna and Felix Resurrecion Hidalgo, two geniuses of the brush; and others.

Spain refused to heed the prophetic cry of the propagandists, instead she persecuted them—this was her colossal blunder. When no ray of hope was in the offing for the fatherland, Bonifacio, a patriotic plebeian, founded in 1892 a secret revolutionary society known as *Katipunan*. He got the idea from his voracious reading of the history of the French Revolution.

In August, 1896, the *Katipunan* unfurled the red flag of revolution at Balintawak hills, near Manila, and raised the cry of "Long live Philippine independence." Within a week, sanguinary battles were fought between the Filipino revolutionists and the Spanish forces.

On December 30, 1896, the Spanish officials committed the gravest blunder in the Philippines by executing Dr. Jose Rizal, idol of the Filipino race. His death gave greater strength to the revolutionary arms; and his name, sanctified by his heroic martyrdom, became the battle-cry of the libertarian struggle.

A year after the outbreak of the revolution, General Emilio Aguinaldo, war-lord of Cavite, succeeded Bonifacio to supreme leadership. The Spanish governor-general exerted all military efforts to check the surging flames of armed resistance, but in vain. To bring about peace and save Spanish honor, he concluded, through Dr. Pedro A. Paterno, the "Pact of Biaknabato" wherein Aguinaldo and his colleagues agreed to leave the Philippines for a large sum of money and other indemnities. This agreement, signed at Biaknabato, Bulacan, December 14-15, 1897, brought only an illusory peace.

Spanish-American War and Spain's Downfall.—Half-way round the world in Cuba events moved swiftly toward a fateful crisis. Like the Filipinos, the Cubans were fighting for their liberty against Spanish tyranny. Sympathy towards the Cuban cause and the blowing up of the U.S. battleship *Maine* in Havana harbor precipitated the Spanish-American War of 1898. Commodore Dewey's Asiatic squadron, following a cabled order from the Navy department, steamed into Manila Bay under cover of darkness, and, before breakfast time of the next day, May 1, 1898, it faced Admiral Montojo's navy in battle array. This historic naval battle went down in history as the greatest triumph of the American navy in the Orient. Dewey sank the Spanish fleet, winning the fight without the loss of a single man.

After the battle of Manila Bay, America rushed her land forces across the Pacific. Meanwhile, General Aguinaldo, accepting Dewey's proffered friendship and allegiance, returned to Cavite from Hongkong, and resumed the revolution with renewed fury. Town after town, province after province, and island after island fell into Filipino hands. Manila and a few Spanish outposts were ringed in by Aguinaldo's forces. On August 13, 1898, Manila capitulated before the concerted attacks of American and Filipino armies. The Spanish authorities, however, delivered the city to the Americans only, much to the disgust of the Filipinos. That afternoon the proud flag of Spain was hauled down the parapet of Fort Santiago, and in its place was raised the Stars and Stripes. Spanish rule over the Philippines was finally ended.

The First Philippine Republic.—By the Treaty of Paris, December 10, 1898, Spain ceded the Philippines to the United States. The latter paid the former \$20,000,000 as compensation for the public improvements made in the archipelago.

Relations with U.S. Strained

The Filipino people vigorously protested the treaty arrangements on the ground that their armies won by force of arms the whole archipelago, except Manila and a few outposts, and thus Spain had no moral right to cede what no longer belonged to her. Their remonstrance was not heeded, and this was the beginning of strained relations between Aguinaldo and America. On January 23, 1899, the Philippine Republic was formally inaugurated at Malolos, a town north of Manila, with General Aguinaldo as president. This was a *de facto* government, being born out of a revolution and not recognized by the family of nations. But to the Filipino people, it was a real government, *de facto et de jure*, for it symbolized their age-old dream of liberty. It had a democratic constitution promulgated by the Malolos Congress.

The tension between Americans and Filipinos exploded into a war on the night of February 4, 1899 when a Nebraska soldier fired upon and killed a Filipino lieutenant. This conflict, called "the Filipino-American War, 1899-1902" or "Filipino War of Independence," was a one-sided affair. The Filipinos, with no chance of winning, audaciously engaged Uncle Sam's forces on the fields of battle for the sole purpose of showing the world that they could fight and die for freedom's sake. The Americans blasted all opposition everywhere. President Aguinaldo fled from Malolos, carrying the republic with him. After retreating from place to place, he finally went into hiding in the little town of Palanan, where he was captured on March 23, 1901 by General Funston and his Macabebe scouts. His capture sounded the death-knell of the republic; but the war raged on until June, 1902, when General Miguel Malvar, last Filipino general to defy America, surrendered to the American authorities.

The whole Filipino-American War lasted three and a half years with over 2,000 major and minor fights. The United States lost 4,165 men and \$185,000,000 while the Filipinos sacrificed 16,000 men and untold treasures. To put down the Philippine Republic and "defeat independence in the Pacific," as Senator Hawes said, the American Republic sent 70,000 troopers across the ocean and occupied 400 military outposts under a foreign sky.

Philippine Policy of America.—Fortunately for the Filipinos, it was never the intention of the United States to remain forever as a colonial power in the islands. "The Philippines are ours," enunciated President McKinley, "not to exploit, but to develop, to civilize, to educate, to train in the science of self-government." This altruistic, non-imperialistic American colonial policy has been consistently followed by all American presidents and congresses.

The military government was first instituted in the Philippines, lasting from 1898 to 1901. In 1899, President McKinley dispatched the first Philippine Commission under Dr. Jacob G. Schurman, president of Cornell University, to the islands to make a survey of conditions. In 1900, the second Philippine Commission headed by Hon. William H. Taft was constituted to prepare the ground for establishment of the civil regime.

Taft as Civil Governor

On July 4, 1901, the civil government was inaugurated with Taft as first civil governor. Progressive steps leading to greater autonomy were undertaken by Congress in the ebbing tide of time. In 1902, the Cooper Law (Philippine Bill) was enacted extending

the bill of rights to the Filipino people and promising to establish an elective assembly at some future date. In 1907, the Philippine Assembly was inaugurated, composed of 80 Filipino delegates chosen by popular suffrage. This body acted as lower house, and the Philippine Commission as upper house of the island legislature. In 1916, the Jones Law, making further liberalizing changes in the government, was promulgated by Congress. The Philippine Senate replaced the old Philippine Commission, and the House of Representatives took the place of the Philippine Assembly. The most salient feature of the law was the preamble which expressed America's solemn pledge to grant Philippine independence "as soon as a stable government can be established" in the islands.

From 1919 to 1934, the Filipino people sent twelve independence missions to America to remind her of the independence pledge and to counteract certain subversive forces against the Filipino cause. Two illustrious figures loomed prominently in this peaceful campaign for freedom—Manuel L. Quezon and Sergio Osmena, president and vice-president, respectively, of the Philippine Senate. The historic independence movement was climaxed in 1934 when Congress passed the Tydings-McDuffie Law establishing the Philippine Commonwealth with complete independence after ten years.

The Rise of the Philippine Commonwealth.—Pursuant to the institutional processes prescribed by the Tydings-McDuffie Law, the last Philippine Legislature accepted said law in the special session of May 1, 1934. The Constitutional Convention, consisting of 202 delegates elected by the people, met at Manila from July 30, 1934 to February 19, 1935 and drafted a democratic constitution for the Commonwealth. This constitution was approved by President F. D. Roosevelt on March 23, 1935 and ratified by the qualified Filipino male and female voters in an island-wide plebiscite on May 14, 1935.

The first Commonwealth elections occurred on September 17, 1935. By a landslide majority, Senate President Manuel L. Quezon was elected President of the Commonwealth over General Aguinaldo, Bishop Aglipay, and Senor Racuyal; Senator Sergio Osmena Vice-President over Dr. Melliza and Senor Nabong; and most of the 98 elected assemblymen belonged to Quezon-Osmena's ticket.

Amidst impressive ceremonies, attended by a large congressional and press delegation and by military, civil, consular, educational, and social dignitaries, the Commonwealth was inaugurated on the balmy morning of November 15, 1935. It was cheered by 300,000 eye-witnesses; saluted by 19 American guns; felicitated by the governments of the United States, France, Germany, Japan, China, Spain and Great Britain; and blessed by His Holiness, Pope Pius XI.

Quezon's Brilliant Address

President Quezon's inaugural address was the greatest highlight of the event. Soberly-conceived and sagaciously-phrased, it was universally acclaimed as one of the greatest constitutional documents of the nation's story.

The Commonwealth on the March.—Upon the solid foundation of Asian traditions, Christian religion, Occidental civilization, and American democracy, which are now the patrimony of the Filipino race, the Philippine Commonwealth is building the superstructure of the future Republic. Two years have already elapsed since its pageant birth, and during this brief period it has succeeded in coping with national problems and issues far beyond the wildest expectations of its chauvinistic well-wishers.

So far so good, the world's verdict runs to-day. Will the new nation, the first Christian commonwealth in the Orient and the youngest democracy on earth, be always successful throughout its ten year "trial independence?" And after gaining its complete freedom from the United States, can it maintain and preserve such freedom from foreign aggression? These are questions which only God can answer now with unerring certitude.

With faith, hope, and courage, the Philippine Commonwealth marches on. The Filipino people facing the mighty responsibilities of statehood, still aspire to be free and sovereign, unafraid and undaunted. After all, it is fate which will decide the future of the Commonwealth and not the present caravan of scandalous calamity-howlers who bewail to the skies the coming doom of the young nation. As the Greek dramatist, Aeschylus, said: "Things are where things are, and, as fate has willed, so shall they be fulfilled." And, as Shakespeare declared:

"What fates impose, that men must need abide;
It boots not to resist both wind and tide."

Gold Mining in the Philippines

By A. F. DUGGLEBY*

FROM the earliest times explorers have brought back tales of golden wealth in the Philippines. Chinese records as far back as A.D. 800 tell of natives mining gold and manufacturing golden ornaments. Chinese adventurers organized expeditions to obtain this gold, the first being the Chinese pirate prince Lin Gayen who gave his name to Lingayen Gulf. These raids affected only the coast towns but gradually a lively trade was set up between the two countries which carried Chinese wares far inland in exchange for gold dust. Even to-day excavations in connection with mining works almost invariably find Chinese pottery of patterns several centuries old showing that in those remote days the natives mining gold on the same site traded with the Chinese.

In the sixteenth century came Magellan, the first of a long list of explorers who brought back even more fabulous tales. No doubt the subsequent Spanish colonization was largely influenced by the lure of gold. We have

ample proof of this in the more complete Spanish records especially those of the Church, which show how jealously Spain guarded this new source of gold. When the Christianized natives implored the Spanish government for protection against Moro pirates, their entreaties went unheeded until these pirates attacked the gold mining districts. Then the Spaniards became energetic and remains of their block-houses established at vantage points over-looking the gold mining settlements are still to be seen. Records of the Paracale district where one of these block-houses was established show that the people of that district accompanied their petition to the Queen of Spain with a life-sized set of hen and chicks made of solid gold.

In spite of their avidity for gold the Spaniards did not indulge in mining on their own account to any great extent probably because it carried them back into the unsettled interior in the land of hostile natives. They seem to have been content to secure the gold by trading in the coast towns with the people of the hills. This trading, however, probably greatly stimulated the quest for gold, for records of the Spanish Jefatura de Minas at the time of the American occupation show that with only two exceptions every one of the present gold producing areas was known at that time.

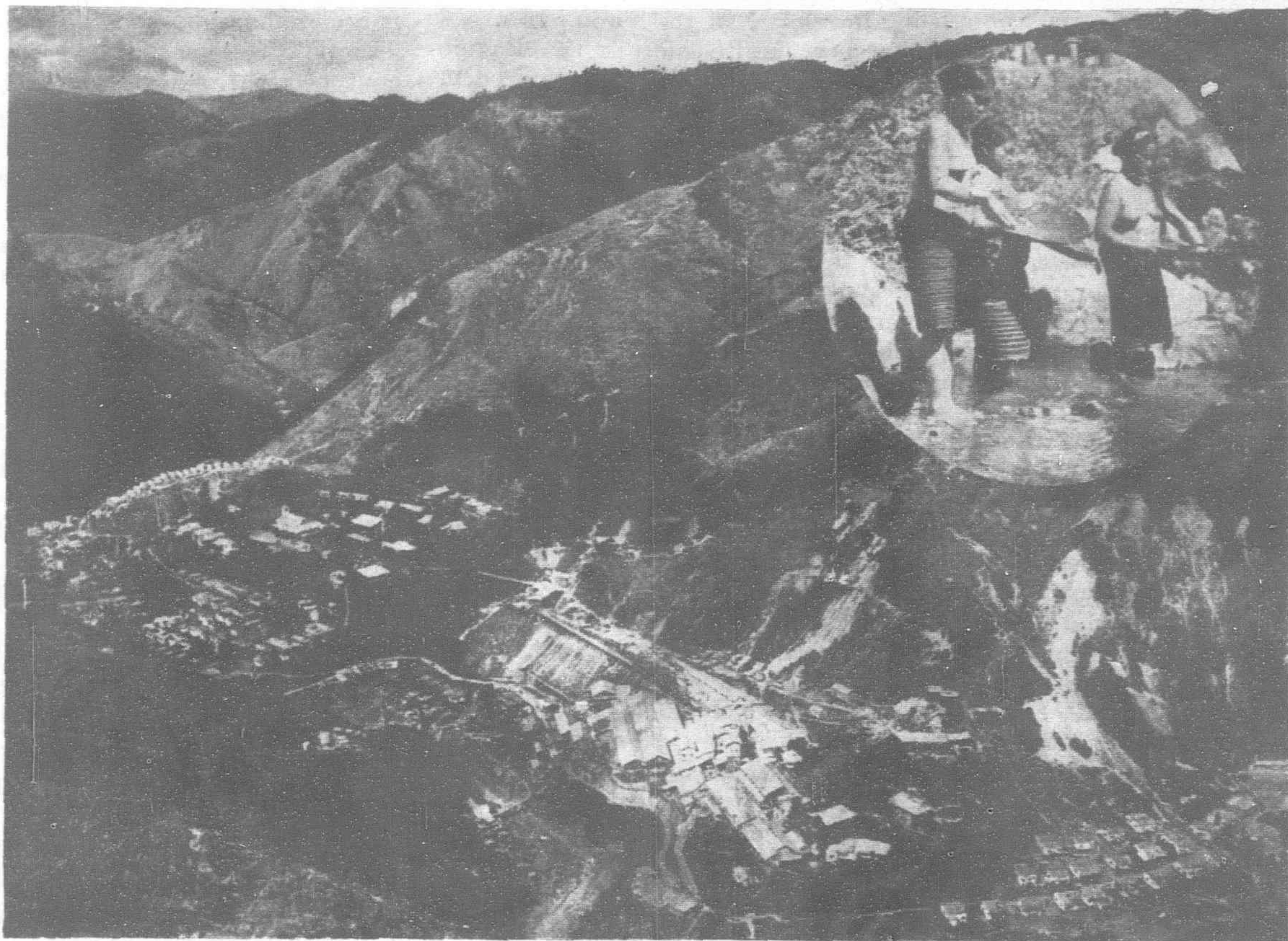
Found Skilled Workers

Following the American occupation of the Philippines, came the soldier-pro prospector, who had enlisted for service in the Philippines because of his intention to seek his fortune in that country where he, following rumors of gold, would have an even chance of discovery for himself. He, unlike his Chinese and Spanish predecessors, made friends with the native people and went back into their hill country to prospect for himself. There he found the Igorots of Northern Luzon who had been skilled gold miners for years actively working gold deposits on a community basis.

Their mining like that of so many primitive tribes the world over was a matter of ritual and superstition. They were led to

the gold by "anitos" or spirits often in the form of an animal. The famous Balatoc mine, for instance, had been known for centuries by the Igorots and was discovered through a vision of a golden deer that when chased disappeared into the hill. The hunters digging at the place where the deer disappeared discovered the outcrop of a marvelously rich vein, according to legend. Chickens were always killed and the entrails examined by the high priest of the village for good or bad omens before any mining work was started. A certain part of the ore was always left so as not to anger the spirits.

The American prospectors were quick to appreciate this last fact and at first eagerly sought out all spots where native legend or the appearance of the surface indicated that the ancients had mined. These "old workings" were located as mining claims under the newly instituted American mining law and out of such



A view of the Benguet Consolidated Gold Mines, of which Benguet with a milling capacity of 1,000 tons a day, is the oldest producing mine in the Baguio district. The inset shows the Igorots of Northern Luzon, the first gold miners in the Philippines, whose mining like that of so many primitive tribes the world over was a matter of ritual and superstition. A certain part of the ore was always left to appease the spirits

claims grew nearly all of our modern mines. It is only within the last two or three years that prospectors have followed up geological criteria and searched for hitherto unworked and undiscovered vein outcrops; prior to that time all prospecting was a search of old workings rather than for new veins.

With the vein already discovered for him and its trend often indicated by the old workings the major part of the prospector's work was already accomplished. All he had to do was to make deeper openings which would tap the vein below the lower limit of the Igorot workings. There he might find good ore still continuing downward, which the Igorot had been unable to work by his primitive methods because of heavy flow of water, refractory nature of the ore, low grade ore, hard ore, etc., and even if this were not the case, the prospector was

* In *Pan-Pacific*

reasonably sure of finding ore left in the Igorot workings due to their superstitions.

Baguio's Ancient Mines

In modern mining operations old Igorot workings with no surface evidence are often encountered underground. These workings, we find, were well supported with a modified square set, a system of mine timbering which at the time of its invention by the famous German mining engineer, Deidesheimer, to solve the mining problem of the Comstock lode, Nevada, was acclaimed as one of the most important discoveries in the mining industry but which we knew now had already been used by the Igorots for centuries. As to the grade of ore which the Igorot was able to mine, we find that he consistently left material carrying less than 0.4 troy ounce per ton indicating that figure to be about his low limit of payability. He had to depend entirely on crushing and panning for recovery of the gold from the ore and his only way of extracting gold combined with pyrite was to allow the pyritic concentrate obtained by panning to oxidize or rust in the open air and then re-grind and re-pan; the idea of burning in order to remove the sulphur apparently never occurred to him.

Such "ancient" mines were the beginnings of the Baguio, Paracale, Suyoc, Masbate, Mambulao, Abra and almost all other gold mining districts now being developed in the Philippines.

The oldest producing mine here is Benguet in the Baguio district. The Benguet Consolidated Mining Co. was organized in 1903 to develop and operate mining claims located in 1902. These claims were at that time far out in the Igorot country, about a week's journey from Manila. Payable ore was found from the start but modern crushing and milling machinery was necessary to extract the gold from the ore; all the ore with readily recoverable gold had been already mined by the Igorots. Misfortune dogged the company for many years; typhoons twice washed out heavy mills laboriously hauled in over trails and lowered into place by ropes; the mine developed tremendous quantities of water which had to be pumped; and power plants had to be installed to provide motive power for the pumps since this was before the days of Diesel engines and roads over which to haul them. Typhoons are still a problem. In a country where a rainfall of 10 to 20 inches a day for three or four days during a typhoon is rather a commonplace—the record at Baguio was in 1911 when 88 inches of rain fell in four days, 47 inches of which fell in 24 hours—underground water flow is a serious problem.

However, the faith of Judge John W. Haussermann, the leading spirit in Benguet and still its president and general manager, carried Benguet through these vicissitudes until finally in 1915 it paid its first dividend. Since then it has never looked back and although in late years it has been threatened with ore exhaustion several times, new discoveries continue to be made underground which besides replacing have added to ore reserves to such an extent as to justify increasing the milling capacity to 1,000 tons a day, which has just been accomplished. Salient facts on the operation at this time are as follows:

Total production to end of 1936	\$34,799,421.00
Production—November, 1937	512,132.50
Original capitalization	500,000.00
Stock dividends	2,500,000.00
Total cash dividends paid to end of 1936	18,775,000.00

The Balatoc mine, also situated in the Baguio district, was also developed by the Benguet Consolidated Mining Co. which owns a 64 per cent interest in the Balatoc Mining Co. This mine which was started in 1927 is now milling 1,200 tons a day and leads the Philippine mines in production. Salient facts regarding it are as follows:

Total production to end of 1936	\$26,724,448.00
Production—November, 1937	547,190.50
Original capitalization	500,000.00
Stock dividends	2,500,000.00
Total cash dividends to end of 1936	11,250,000.00

The Itogon Mine

The third oldest gold producer in the Islands is the Itogon mine controlled by the Marsman interests. This mine adjoins

Balatoc and is now milling at the rate of 1,000 tons a day. Salient facts regarding it are as follows:

Total production to end of 1936	\$6,299,953.00
Production—November, 1937	169,510.00
Total capitalization	1,000,000.00
Total cash dividends paid to end of 1936	991,875.00

Antamok Goldfields, the third largest producer in the Islands is also situated in the Baguio district, adjoining Benguet. This mine is the headliner of the Soriano interests and has a daily milling capacity of 750 tons. Pertinent data regarding it are as follows:

Total production to end of 1936	\$4,521,819.00
Production—November, 1937	221,156.00
Original capitalization	687,500.00
Stock dividends	687,500.00
Cash dividends paid to end of 1936	1,531,250.00

I.X.L. is the youngest and at present the large producer in the Masbate district. This is a Soriano property with a milling capacity of 160 tons per day.

Total production to end of 1936	\$815,813.00
Production—November, 1937	114,208.00
Capitalization	750,000.00
Total dividends paid to end of 1936	100,000.00

Masbate Consolidated, oldest mine of the Masbate district is a consolidation of two older mines, the Syndicate and Colorado. The new company started operation in 1935. This mine, now equipped with a 2,000 ton mill, is the largest in the Islands.

Total production since consolidation up to end of 1936	\$1,274,942.00
Production—November, 1937	107,935.00
Capitalization	2,500,000.00

United Paracale, the leading mine of the Paracale district is a Marsman controlled property which started operation in 1935 with a 325 ton mill.

Total production to end of 1936	\$936,315.00
Production—November, 1937	99,454.00
Capitalization	550,000.00
Dividends paid to end of 1936	137,500.00

Demonstration, another mine of the Baguio district, is the leader of the Ralston group. It is equipped with a 200 ton mill which started operations in 1934.

Total production to end of 1936	\$1,203,344.00
Production—November, 1937	69,799.00
Capitalization	500,000.00
Dividends paid to end of 1936	200,000.00

Baguio Gold, also in the Baguio district, started production in 1933 with a 200 ton mill.

Total production to end of 1936	\$1,514,694.00
Production—November, 1937	65,487.00
Capitalization	1,000,000.00
Dividends paid to end of 1936	64,945.00

The above mentioned are the ten leading gold mines of the Philippines at the present moment. As many of them, however, have only been started in the past two years and are still expanding operations, the order of importance changes from month to month.

There are many smaller properties both producing and still in the development stage. These bring the production figures up to the following:

Total production to end of 1936	\$105,295,143.00
Production—November, 1937	2,278,572.00
Production—1936	22,201,326.00
United States production—1936	150,959,270.00

From this it will be seen that the Philippines now occupies an important place as a gold producer.

It produces about one-seventh of the United States productions; exceeds Alaska and is exceeded only by a single state, California.

It may be truthfully said that this remarkable industry which has become one of the mainstays of the economic structure of the Philippines has been entirely developed since American occupation and is therefore a real tribute to the American prospectors who ventured out into the "wilds"; to the American businessmen such as Judge Haussermann who had the faith to support these prospectors and develop their discoveries and to the foreign and Filipino capitalists such as J. H. Marsman and Andres Soriano who have lately contributed their capital toward expansion of the industry.

Bamboo as a Reinforcing Material

By F. A. McCLURE, Curator of Economic Botany, Lingnan Natural History Survey and Museum, in the Lingnan Science Journal

THE writer was asked recently to recommend a bamboo locally available in quantity and having characteristics likely to fit it for use as a reinforcing material for cement construction. Data on the longitudinal crushing strength of the bamboo were requested at the same time.

The variety known locally as *Hua-mei Chu* was chosen for recommendation because the uses to which it is commonly put by the Chinese people require substantially the same mechanical characteristics as those desired in a reinforcing bamboo, namely, durability and high longitudinal crushing strength. This bamboo is locally used chiefly for scaffolding, for the framework of matsheds and for punting poles, for which purposes it has no peer. This bamboo is always referred to in the markets and among building constructors at Canton as *Ch'ang-kao Chu*, but inasmuch as this vernacular name is also sometimes applied, erroneously, to the closely related species, *Bambusa tuldoidea* Munro, it seems best to give preference to the name which has not been misused. The names *Ni Chu* and *Yu Chu* are also used for bamboos of this species in some localities.

Botanically, this variety differs from *Bambusa tuldoidea* Munro in a number of technical characters and will be given taxonomic standing by publication in a separate paper. Among those who use bamboo in construction work, it is considered to be markedly superior to *B. tuldoidea* in both strength and durability. Furthermore, as seen in the Canton markets, the culms of this thick-walled bamboo are readily distinguishable from all others, with which they are likely to be confused, by the presence of light colored longitudinal striations on the internodes. The name *Hua-mei Chu* alludes to these characteristic stripes. These stripes are still recognizable, even after the bamboo has been subjected to soaking in water for some time.

Material Chosen at Random

The material secured for testing was selected at random from the stock of a wholesale dealer in Canton, and represents fairly well what would be obtained if the bamboo were to be purchased in quantity from the open market for actual use in the proposed construction. The original source of the stock was given as Hwaitsih District, Kwangsi, which is, in fact, the source of a large share of the industrial bamboos sold in Canton. It is possible, however, that the material tested may have come from Ts'ung-hwa District, Kwangtung, where this bamboo is also known to be cultivated in some quantity.

In China, bamboo is commonly transported to market from the place of its origin by rafting, and is usually subjected to immersion in river water for a minimum period of several weeks. Upon reaching their destination, the rafts are often submerged completely for one or two months more by being weighted down with mud. The effect of this treatment is to cure the wood somewhat, and to increase considerably its resistance to the attacks of fungi and of powder-post beetles. This is accomplished presumably through the removal of certain nutritive substances by means of bacterial fermentation and leaching. The exact length of the period of submersion to which the present material had been subjected is

not known but, judging from observable facts, in all probability it is not less than one month. The poles had been removed from the water for some days already when they were purchased. Some areas of the cortical tissue remained alive and green, while others were dead and brownish-grey in color. Care was exercised to select specimens representing a considerable range in size, in order to ascertain the relative efficiency of large and small culms.

Ordinarily it would be highly desirable to know the precise origin of the material tested, its age when cut, the length and the nature of the treatment to which it may have been subjected after cutting, the moisture content when tested, etc. In view of the urgency of the need for preliminary data, however, these bases for a thorough and scientific test of the bamboo had to be dispensed with.

In order to have a convenient unit for testing and for calculations, the culms were cut into one-foot lengths. The preliminary cuts were made by means of a carpenter's hand saw, care being exercised to avoid the splintering of the surface layer, and to make

the cuts as nearly as possible at right angles to the theoretical axis of the stem. The ends were then further trimmed with a spoke-shave to bring them nearer to the desired angle with the axis. Finally, the two ends were made flat and as nearly parallel to each other as possible by means of a sand-paper disk operated by an electric motor.

Straight Sections Rare

The culms are naturally more or less geniculate at the nodes, that is to say, the whole culm is somewhat flexuose or zigzag in habit, the angles falling, roughly, in a single plane. The interior angle at each node occurs on the side opposite the branches, the successive branch clusters occurring in alternate arrangement, i.e., first on one and then on the other side of the culm (see Fig. 1, A). Since the internodes of the lower portion of the culms of this bamboo, which alone is suitable for the intended purpose, are

usually not more than a foot long, it was not possible, practically speaking, to secure straight sections. The results here given represent, therefore, the actual crushing strength of the material as it comes from the market. This is, no doubt, considerably lower than would have been shown for straight sections of similar dimensions, since the load could not be balanced in perfect distribution in relation to the axis in any case, even though the end surfaces were parallel or nearly so (see Fig. 1, B and C).

The angularity of the sections could have been reduced somewhat by first straightening the culms by means of heat and pressure. This was not considered desirable, however, since it probably is not feasible, from a practical point of view, to subject the culms to this treatment before using. This point should be settled, however, in subsequent tests, and by experiment, since the crushing strength of the culm would be increased considerably by bringing the real axis into closer coincidence with the axis of the thrust. The measurements of the culm sections and the results of the tests are recorded in the accompanying table.

The maximum weight supported was 15,050 lb. Thus the strongest section was C2, which had a diameter of 5.5 cm. (about

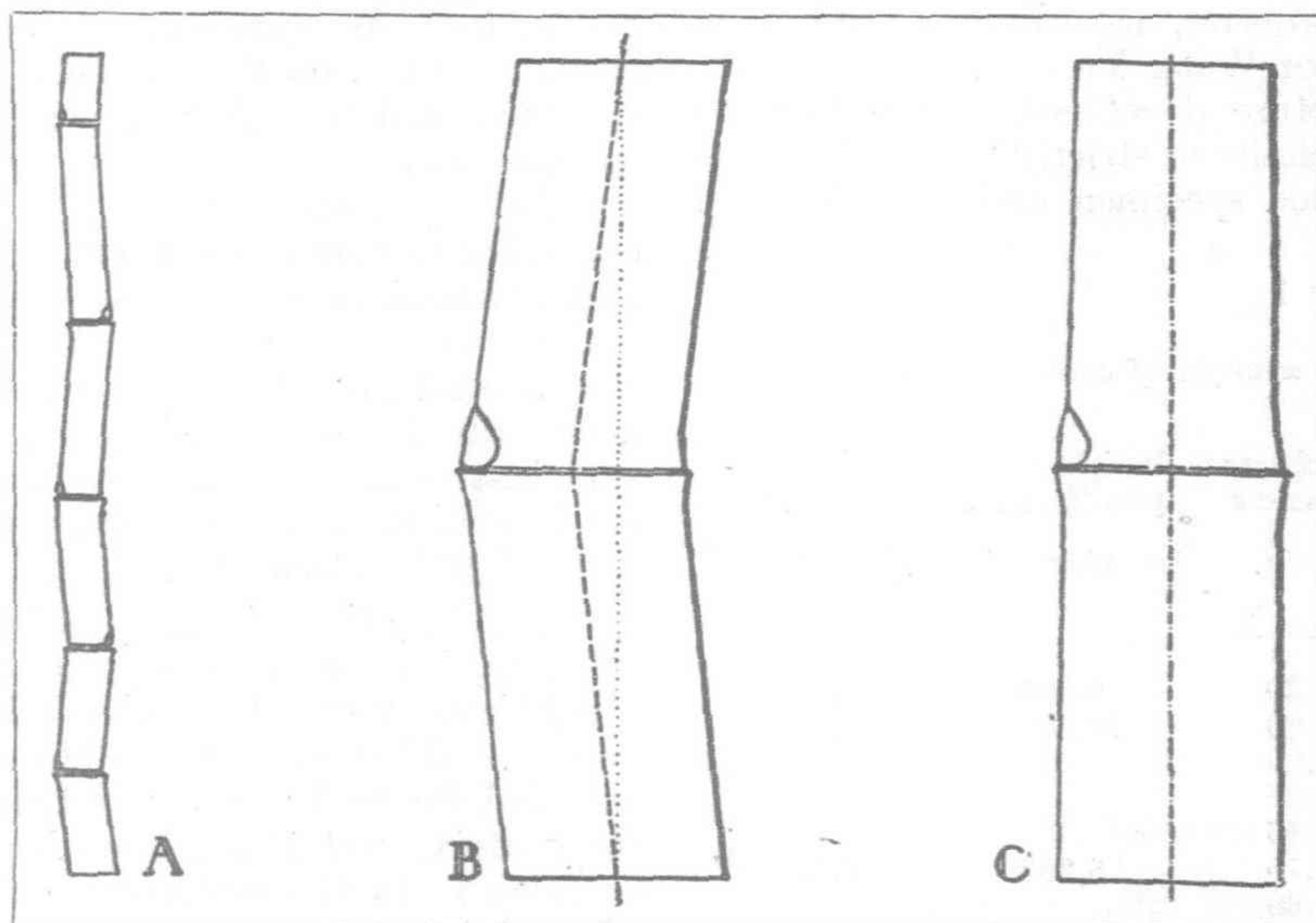


Fig. 1. A. A somewhat exaggerated indication of the zigzag nature of the culms as found in the market. B. Diagrammatic sketch of a portion of a culm, including a geniculate node, showing discrepancy between the real axis (broken line) and the axis of the lines of force (dotted line) as applied in the longitudinal crushing strength test. C. Sketch of a portion of a culm in which the node is straight (not geniculate) showing the coincidence between the real axis and the axis of the lines of applied force, a condition necessary to the delivery of the highest longitudinal crushing strength.

2½-in.) and an average wall thickness of 1.45 cm. (about ⅝-in.). It is a striking and significant fact that this section continued to support 11,650 lb. even after the initial rupture had taken place. The weakest section tested was A22, which was 2.65 cm. (just over 1-in.) in diameter, with walls but 0.35 cm. (about ⅛-in.) thick. This section supported 2,710 lb. at the breaking point, after which it continued to support 660 lb. Every section tested had a joint or node, with the exception of A12. There is no indication that its strength was greater or less than that to be expected from an examination of the other results.

One Has Lower Crushing Strength

In both specimens A and C, in which the basal section was tested, this section showed a lower crushing strength than the second section. It is probable that the chief reason for this is that the second section was straighter in both cases. It is possible, also, that the tissues of the base of every culm suffer somewhat from the strain undergone at the time of felling, and perhaps also, to a minor extent, from subsequent deterioration.

It is noteworthy that the bamboo culms tested behave very differently from the average of construction timber tested for longitudinal crushing strength, in that they retained a very considerable resistance even after the peak load had been reached and the primary rupture started. This fact is brought out by a comparison of the figures in the last two columns of the table. Excepting in very tough woods, the resistance drops, as a rule, very markedly after the primary rupture, according to tests made in the Laboratory here by Professor Wang Yu-wen.

Furthermore, the line of rupture developed in the bamboo sections tested was not nearly so definite or strictly localized as that which develops in the average wood specimen under longitudinal

compression. This may have been due in part to the uneven distribution of the load in relation to the axis of the culm which prevailed to a greater or lesser degree in every section tested. But it would seem reasonable to suggest the possibility that it may have been due in part to the peculiar mechanical structure of the bamboo culm, which is essentially a hollow, cable-like arrangement, of continuous, tough fibers (the fibro-vascular bundles) set in a flexible matrix of parenchyma cells. Very often the breakdown occurred at one or the other extreme of the section, through splitting. This suggests that the longitudinal crushing strength of sections of bamboo might be increased by protecting the ends by means of bands, or caps, in order to delay the development of the rupture of the tissues at these two weak points. In the case of a cement column reinforced with unsplit bamboo, the supporting action of the cement matrix would, conceivably, have such an effect, actually increasing the resistance of the individual bamboo reinforcing units beyond what they would show when standing unsupported.

Only Preliminary Work

These results are published as a preliminary report only. Their incompleteness and inadequacy is patent, and yet they are of considerable interest as giving the first indication we have of the approximate longitudinal crushing strength of any bamboo species from this area. Since bamboo continues to be used as a reinforcing material in cement construction, it is highly desirable that the species of promise in this connection should be tested for their mechanical properties. As suggested above, it is not sufficient to test the stock available on the market. Standardization of results should be attempted by using properly identified material from known sources and of known age, and whose subsequent history is definitely known. It is well confirmed that soil and other ecological factors often exert profound effects upon the physical and mechanical properties of wood, and it is not likely that bamboo is an exception. We already know, in a general way, the special adaptabilities of the various species of bamboo commonly in use in this area, but this knowledge is no longer sufficient to meet the needs of modern engineering. Specifications are becoming more exacting, and industrial materials must come up to definite standards.

Granting the suitability of bamboo as a material for reinforcing concrete, it seems to the writer that, in the interest of safety, we should know more about what takes place after the cement has been poured. What happens to the bamboo after the cement matrix sets and the moisture content drops? Does it shrink away from the matrix, and if so, how does this affect the strength of the complex? Is the resistance of the bamboo to attack by fungi affected in any way by the covering of cement? If so, how? May wood-boring insects already in the wood be able to continue to work after having been imprisoned by the hermetical sealing of the bamboo in cement? What are the shortcomings of bamboo as a reinforcing material, and how may they be overcome by special treatment? May straightening the culms artificially add to their strength? May treatment with creosote or other substances overcome any tendency for the imprisoned culms to succumb to the development of fungi?

Acknowledgments

These tests were undertaken at the suggestion of Dr. E. P. Goodrich, Consulting Adviser to the Whampoa Port Development Administration.

Permission to make use of the equipment in the Testing Laboratory of the College of Engineering of Lingnan University was graciously extended by Dean Li Ch'üan-hsiang. The testing machine, an electrically powered unit of 50,000 lb. capacity, manufactured by Riehle Bros. of Philadelphia, was operated by Professor Huang Yu-wen of the staff of the Engineering College of Lingnan University. Mr. Li P'êng-fei assisted the writer during a part of the operations by making some of the measurements and recording and tabulating some of the results.

The Testing Laboratory of the College of Engineering of Lingnan University has been designated by the Ministry of Industries of the Chinese National Government as the official center for testing industrial materials used or originating in southern China.

TABLE I

Measurements and crushing strength of culm sections

Section Number	Basal diameter in centimeters	Wall thickness in centimeters	Weight supported (lb.) (longitudinal crushing strength)	
	max. | min.	max. | min.	breaking point	after rupture
SPECIMEN A				
1	5.20—4.50	1.50—1.30	9,500	7,850
2	4.70—4.50	1.25—1.00	10,000	8,490
3	4.90—4.80	1.25—1.00		
4	5.10—5.10	1.45—1.25		
5	5.20—5.10	1.30—1.25		
6	5.00—5.00	0.80—0.75	8,285	6,620
7	4.90—4.90	0.70—0.60		
8	4.90—4.80	0.60—0.50		
9	5.00—4.90	0.60—0.50		
10	4.80—4.75	0.50—0.50		
11	4.75—4.65	0.50—0.50		
12	4.70—4.30	0.50—0.50	5,240	3,920
13	4.50—4.50	0.50—0.50		
14	4.20—4.20	0.50—0.40		
15	4.10—4.10	0.50—0.40	4,805	2,510
16	4.00—3.80	0.40—0.40		
17	3.75—3.70	0.30—0.30	3,500	2,570
18	3.60—3.50	0.30—0.30		
19	3.50—3.40	0.40—0.40		
20	3.20—3.10	0.35—0.35		
21	3.00—2.90	0.25—0.25		
22	2.70—2.60	0.35—0.35	2,710	660
23	2.40—2.40	0.45—0.40		
SPECIMEN B				
2	3.90—3.80	0.90—0.70	7,150	5,670
9	4.00—4.00	0.50—0.50	6,450	5,500
16	3.10—3.00	0.40—0.40	4,375	2,500
SPECIMEN C				
1	5.60—5.50	1.80—1.60	14,595	12,130
2	5.50—5.50	1.50—1.40	15,050	11,650
3	5.40—5.20	1.20—1.20	14,300	9,200
4	5.50—5.50	1.00—1.00	12,745	9,770
5	5.40—5.40	1.00—1.00	12,355	10,255
6	5.50—5.50	0.90—0.90	11,695	9,500
7	5.40—5.40	0.90—0.90	11,600	6,800
8	5.30—5.30	0.80—0.70	11,310	9,850
9	5.40—5.30	0.70—0.70	9,250	7,675
10	5.30—5.30	0.60—0.60	9,140	7,200
11	5.20—5.10	0.70—0.60	8,930	6,000

Japan's Progress in Electric Power

JAPAN's electric power and light industry dates from November, 1887, when the Tokyo Electric Light Co. began serving 75 incandescent lamps, using a home-made generator. This first commercial station was at Nihonbashi, Tokyo. Three more generating stations were constructed by the same company in 1888, and in September of that year the Kobe Electric Light Co. was formed. The following year the Osaka Electric Light Co. was incorporated, and later Kyoto, Nagoya and Yokohama were also supplied with electricity.

By the end of 1890, the generating capacity of public utility companies in Japan was about 1,500 kilowatts, including two 80 kw. generators installed in Kyoto in connection with the construction of the Lake Biwa canal. The first hydro-electric plant in Japan, these two generators were placed in service in May, 1890.

Kyoto was the first city to have electric street-cars. Using the overhead trolley system, the Kyoto Electric Railway Co. opened its line to traffic in February, 1895. The Nagoya Electric Railway Co. and others followed in quick succession in 1898 and after.

Transmission Expanded

Power generation and transmission was gradually expanded in scale. Beginning with the success of the Koriyama Silk Spinning Co., Fukushima, in transmitting 10,000-volts over a distance of 15 miles in 1899, long-distance high-tension transmission has featured subsequent projects. In 1907, a project to transmit 55,000-volts from a 15,000 kw. hydraulic plant at Kamabashi, on the Katsura river, to the capital was successfully completed by the Tokyo Electric Light Co.

The industrial activity following the Russo-Japanese war (1904-05) stimulated the electric power industry tremendously. The generating capacity by the end of 1907 had risen to 110,000 kw. from the total of 44,000 kw. at the end of 1903, and 780,000 lamps and 8,000 kw. of motors had been connected. Steam power predominated in those days. At the end of 1903, a total of 31,000 kw. was produced by steam plants against 13,000 kw. by water wheels.

Recognition of the economic importance of hydro-electric power led to the organization of the government water power survey in 1910 under the direction of the Communications Minister. Its three years' investigation of the potential water power of the country did much to promote the hydro-electric industry in the years following.

Water Power Takes Lead

Water power outstripped steam power as a source of electricity during 1912, and from that year the rapid development of large water power sites and the introduction of large-scale generation, backed by enormous amounts of capital, to meet the urgent demand for electricity in the boom years during and after the World War brought about a new era in the industry. At the end of 1919, the total generating capacity was 1,100,000 kw., consisting of about 700,000 kw. of hydraulic and about 400,000 kw. of thermal power plants.

It was found, however, that the minimum flow estimated by the government water power surveyors at a limited number of preferred sites was not the most economical basis, and the adoption of a greater flow as the basis of water power development was the tendency of engineers in those days. Consequently, the survey was repeated between 1918 and 1922 to ascertain the hydro-electric power available for industrial purposes from the standpoint of the economic utilization of water power resources.

This second survey revealed that the water power available at 2,822 sites was sufficient to produce 4,786,000 kw. on the basis of the minimum flow, and 10,051,000 kw. at the maximum flow, based on the flow for six months. The annual average was 8,902,000 kw.

These large, preferred sites have been developed one by one, with 200 to 400 km. transmission lines leading to the load centers. Outstanding among them are the stations of the Daido Electric Power Co. on the Kiso, the so-called Japan Rhine, and the Tenryu, those of the Nippon Electric Power Co. on the Kurobe and other rivers in the Hokuriku district, those of the Showa Electric Power Co. on the Sho, and those of the Tokyo Electric Light Co. in the

Koshin-etsu, Joetsu, and Aizu districts and on the Agano. Completion of the 154 kw. transmission lines not only made possible the overhead transmission of power to Tokyo, Yokohama, Nagoya, Kyoto, Osaka and Kobe from out-of-the-way places, but also the interconnection of plants, which permitted an interchange of power and the attainment of great economy in power generation.

Progress in machinery and the lower price of coal have made thermal plants much more economical than at the beginning of their history, and the construction of large steam plants as the reserve plants for hydraulic stations with water reservoirs have appeared in quick succession. The recent practise is to harness water power on the basis of six months' flow.

Centralization Trend

While the number of electric power undertakings for public service has increased with the growth of the industry, the trend has been toward centralization of ownership and control. Mergers and consolidations were resorted to by so many power companies that a reduction in the number of the electric power undertakings was observed until the revision of the Electric Power Undertaking Law in December, 1932, raised the former private power plants to the status of power supply undertakings.

Power plants for the exclusive use of the industrial owners have also steadily increased in number. At the end of 1936 their total capacity was estimated at 983,450 kw., of which water power supplied 107,787 kw. and thermal or other power 875,663 kw. Thus, in 1936, the total capacity in the country for both public service and private use was 3,759,334 kw. by water power and 2,924,778 kw. by thermal power and others (government railway plants, which are excluded, amounted to 88,600 kw.).

Electric railway lines have gradually spread, and the figures covering their length at the end of 1925, 1930, 1936, are as follows respectively:

1925 ..	..	..	..	..	2,922 km.
1930 ..	..	..	..	..	5,740 km.
1936 ..	..	..	..	..	5,977 km.

Electrification Advances

In addition to the above, the rapid electrification of the government railways was also remarkable.

1925 ..	..	..	..	..	180 km.
1930 ..	..	..	..	..	235 km.
1936 ..	..	..	..	..	611 km.

The total investment in electric light and power supply and electric traction (excluding the government railways) surpassed ¥6,451,838,000 at the end of 1936, the earnings of the business as a whole being quite satisfactory.

The constant increase in the demand and the improvement of equipment, mutually stimulating, have played an important part in the betterment of the public service offered by the electric power companies and are promoting the culture of the nation as a whole.

GENERATING CAPACITY OF ELECTRIC POWER PLANTS AT THE END OF 1936,
CLASSIFIED BY PURPOSES OF UTILIZATION

Power plants	For Power Supply				Total kw.	Plants for private use kw.	Grand Total kw.
	Retail kw.	Whole-sale kw.	Combined with traction kw.	For electric traction kw.			
Water power ..	4,200,535	677,625	316,966	51,840	5,246,966	189,642	5,436,608
In operation ..	2,915,322	503,200	231,185	1,840	3,651,547	107,787	3,759,334
Under construction ..	1,285,213	174,425	85,781	50,000	1,595,419	81,855	1,677,274
Thermal power ..	1,489,690	529,846	34,475	77,200	2,441,211	865,742	3,306,953
In operation ..	1,331,690	399,846	32,300	69,200	2,125,036	799,742	2,924,778
Under construction ..	158,000	130,000	20,175	8,000	316,175	66,000	382,175
Internal combined ..	13,548	3,000	828	100	17,476	84,245	101,721
In operation ..	13,461	3,000	828	100	17,389	75,921	93,310
Under construction ..	87	—	—	—	87	8,324	8,411
Total ..	5,703,773	1,210,471	662,269	129,140	7,705,653	1,139,629	8,845,282
In operation ..	4,260,473	906,046	556,313	71,140	5,793,972	983,450	6,777,422
Under construction ..	1,443,300	304,425	10,956	58,000	1,911,681	156,179	2,067,860

(Continued on page 240)

Construction Work in Mukden*

By GEO WHITE

THE 1938 construction season is in full swing in the city of Mukden, which since the establishment of the new metropolis in Hsinking has been shifting from the political and administrative center to the industrial and commercial of Manchoukuo.

What are the prospects for this year's construction in Mukden, the "new Osaka of Manchoukuo," and for business of contractors, who are now making this city the center of their activities to which they are reportedly to remove the head office of the Manchuria Contractors' association from Dairen?

Judging from references obtained through the courtesy of the local Japanese Chamber of Commerce and Industry, as well as statistics from the Mukden branch of the Contractors' Association, it might be said that though the principal construction work of the initial period have been gradually completed during the six years past, the scale of Mukden construction still continues to be on an upward trend. This is best illustrated by the table, given below, which shows the cost of construction and its index-number for each year, beginning from 1931:

Year	Construction Expenditure	Index-No.
1931 ..	Y.922,000	100
1932 ..	2,392,000	259
1933 ..	11,137,000	1,207
1934 ..	27,571,000	2,990
1935 ..	20,756,000	2,250
1936 ..	26,427,000	2,865
1937 ..	47,441,000	5,149

While government construction, except for special military work, has been decreasing, other factors, such as the rapid growth of industries, particularly those in the West Mukden Industrial District, the establishment of the General Directorate of Railways, the abolition of extrality and the transfer of the S.M.R. zone to Manchoukuo, the five-year reconstruction program and growth of the Mukden population, have given a further impulse to the development of construction work.

The rapid increase in the Mukden population, which jumped from 472,450 at the end of 1933 to 721,549 at the end of last January and a corresponding, or proportionately larger, increase in households which numbered at the end of January last 137,996 as compared with 87,262 at the end of 1933, have prompted incessant construction of residential buildings, apartment houses and dormitories, the number of which cannot as still not able to meet the ever increasing requirements.

New Industries

The continued influx of new industries to the West Mukden Industrial District has necessitated further expansion, and the Mukden Municipality has started negotiations with the owners of neighboring lands regarding the purchase of 100,000,000 of tsubo of land. These negotiations, which are expected to be concluded by May or June, will open a new and great field for the further development of construction activities in this district. Within less than three years 1,500 hectares of vacant land to the west of the S.M.R. main line have been developed and turned into a large industrial town, with commercial and residential sections, wide roads and all modern facilities. Beginning from March 1935, and up to the end of 1937 144 factories have been constructed and put into

operation in this district. Their classification and number are as follows:

Classification	1935	1936	1937	Total
Spinning and Weaving ..	4	—	2	6
Iron and Steel	8	3	14	25
Machinery and Tools ..	7	1	12	20
Bricks and Tiles	3	1	2	6
Chemicals	9	1	6	16
Provisions and Beverages ..	15	3	2	20
Electrical	—	—	1	1
Lumber	2	1	2	5
Miscellaneous	7	1	7	15
Total	55	11	48	114

Besides the execution of its further program of road construction the General Directorate of Railways is expected to spend this year about 6,000,000 yuan for construction, of residences including 140 houses for its married employees and several dormitories with a total of 80 rooms for bachelors along the S.M.R. line, as well as 1,430 houses and dormitories of 270 rooms along the State railways. The construction of a new five-story building for the Mukden Directorate of Railways is also to be started this year at a cost of 2,000,000 yuan.

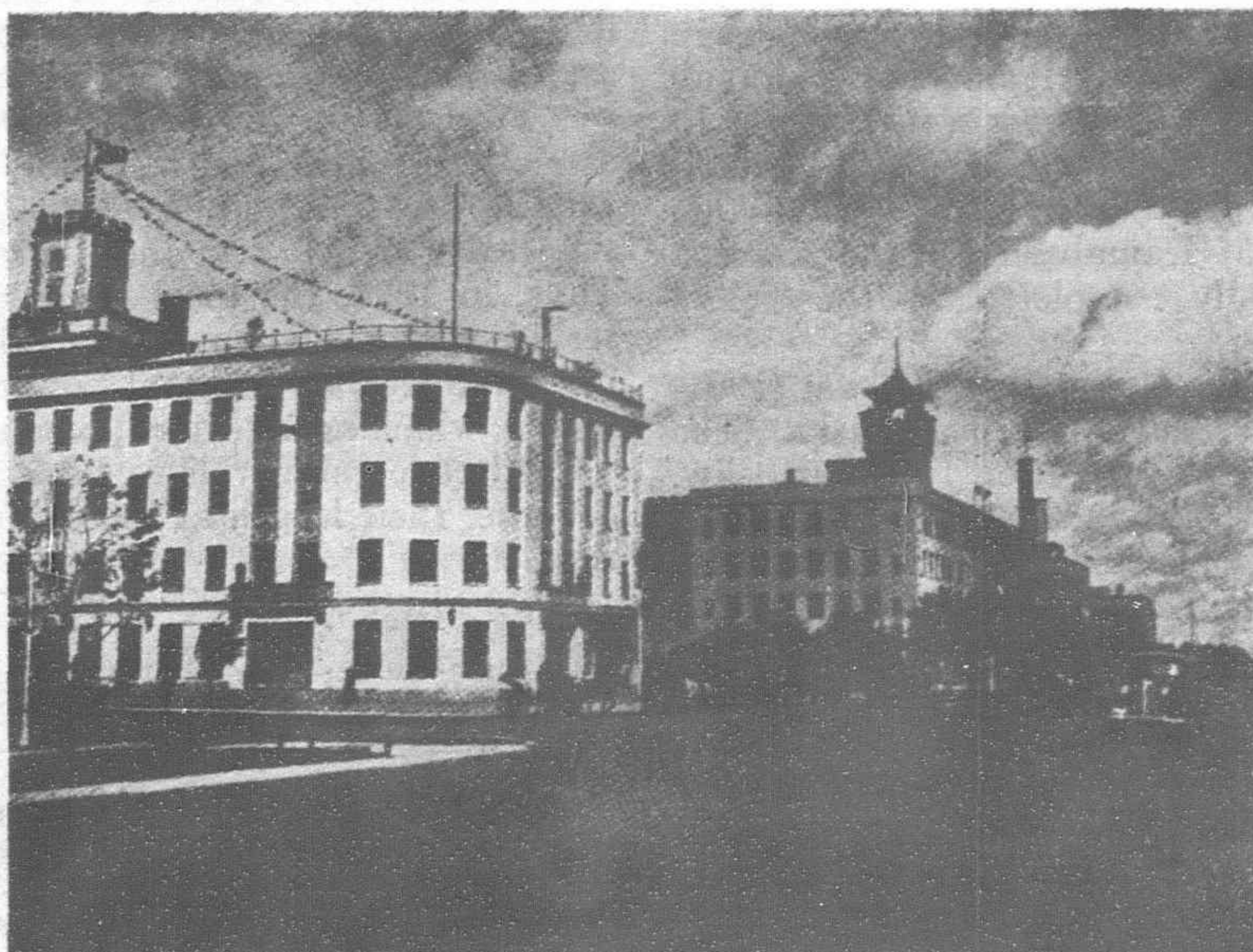
Though building construction of the S.M.R. and the Kwantung Bureau has decreased, in connection with the abolishment of extrality and transfer of the S.M.R. zone to Manchoukuo, this is compensated for by the considerable increase in Municipal construction. The construction of new and the enlargement of old Municipal schools, improvement and extension of roads, construction of Municipal slaughter houses, Municipal markets, additional waterworks

at Peiling, establishment of a new residential section along the road to Peiling and other work, connected with the Greater Mukden City Plan lie in store for local contractors.

Classification	Year	No.	Cost in Y.
Special Work	1936	—	—
	1937	—	—
S.M.R.	1936	399	1,367,071
	1937	267	998,786
Manchoukuo Government ..	1936	29	407,513
	1937	50	428,810
Kwantung Bureau	1936	—	—
	1937	—	—
Private	1936	11	62,993
	1937	36	305,745
Total in Mukden	1936	439	1,837,577
	1937	362	1,733,341
Outside of Mukden	1936	77	2,948,377
	1937	152	20,767,493
Grand Total	1936	516	4,785,954
	1937	514	22,500,834

(Continued on page 240)

*In Manchuria.



A newly built street in Hsinking

A Unique Architectural Development by Japan*

STARTINGLY new architectural development in Japan has resulted in the appearance of a structure which, irrespective of its size and dimensions, does not require any columns and girders, thereby making a larger floor space available and at the same time insuring superior resistance to earthquake and climatic disturbances. The material used in constructing such a building is called by its patented name: "Diamond Truss."

The Diamond Truss is manufactured by the Tomoe Gumi Steel Works, Ltd., No. 4, Higashi-Gashidori 9-chome, Tsukishima, Kyobashiku, Tokyo. The Mitsui Bussan Kaisha, Ltd., is the sole distributor of this product. It is a new building product which has incorporated in its construction, structural soundness, economy, strength, and architectural beauty. This product is manufactured on the basis of three basic principles that are to be outlined. In fact, the product is the sum total of the efforts to materialize these three principles faithfully in an idealistic manner. The principles are:

- (1) The product must meet the exacting criterion of structural analysis for soundness.
- (2) The structure using the product must possess inherent strength to resist ordinary loads for which it is designed and also natural forces in the form of earthquakes and atmospheric disturbances.
- (3) The product must meet the practical standard of economy in material and labor costs. Furthermore, when the building using the product is completed, it must possess aesthetic value, being pleasing in appearance.

How the Diamond Truss has blended these considerations in its composition is outlined thusly:

The shape of the Diamond Truss is an arch, the equation of which is approximately parabolic. From elementary mechanics, it is a recognized fact that a structural member subjected to a system of uniformly distributed loads will have bending movement values which are expressed by parabolic equations. Owing to the characteristic shape of the Diamond Truss, the bending moment values are made to coincide closely with the shape of the structural members, thereby largely eliminating bending stress and causing only direct or normal stresses to occur in them. The elimination of the bending stress makes possible an appreciable saving in the cross-section of the members which is a direct measure of the saving in the material.

The inherent strength of the Diamond Truss is due to the fact that each unit of the truss is a rigid system composed of triangles and the structure is radially braced, so that the completed structure is particularly strong in its resistance to horizontal and vertical forces. The nature of the structural combination renders it very suitable in resisting earthquakes and atmospheric disturbances. In the matter of economy, the erection of the Diamond Truss is accomplished without the use of falseworks. This alone represents a considerable saving in material and labor costs. The units of the truss are readily and simply joined by using flat plates and

rivets, bolts, or by welding. The arch action of the truss makes the structure rigid and strong and the completed structure possesses a quiet dignity and unsurpassed beauty of simplicity which clearly indicate the functionalism of the building.

Composition of D. Truss

The Diamond Truss is composed of units approximately two meters in length and 60 centimeters in depth. Ordinary commercial-size angles are used for the top and bottom members as well as for the vertical and diagonal bracings. The end elevation and section are shown in Figure 1 and the side elevation and transverse section in Figure 2. Figure 3 clearly indicates the structural units and the method of joining them with the use of flat plates and rivets. The roofing of the structure depends

on the nature of the desired results. Any of the ordinary roofing materials ranging from wooden shingles and slate to corrugated iron or galvanized iron may be used. If it is desired to regulate the amount of light admitted into the building, canvas or other suitable material may be used. The detail at the crown to take care of the flow of rain water presents no difficulties in any case whatsoever. This is accomplished by the use of slopes with or without gutters. The entire structure is enclosed with a suitable material to protect it against the elements.

Figures A, B, and C are interesting illustrations of actual buildings under construction and show how the structures are self-supporting without the use of false-works. All of these pictures show the characteristic absence of elaborate false-work. The erection equipment consists of two wooden poles placed at the ends of the building over which two wire ropes are suspended. Two sets of trolleys and tackles are suspended from the wire ropes while another wire rope is strung on each tackle. The power is applied to the wire ropes by means of two winches which raise the members of the Diamond Truss to the desired location. Figure A and B show a structure of

which the span is 50 meters; length, 64 meters, and the internal height, 20 meters. Figure C is a structure of which the span is 50 meters and the length, 55 meters.

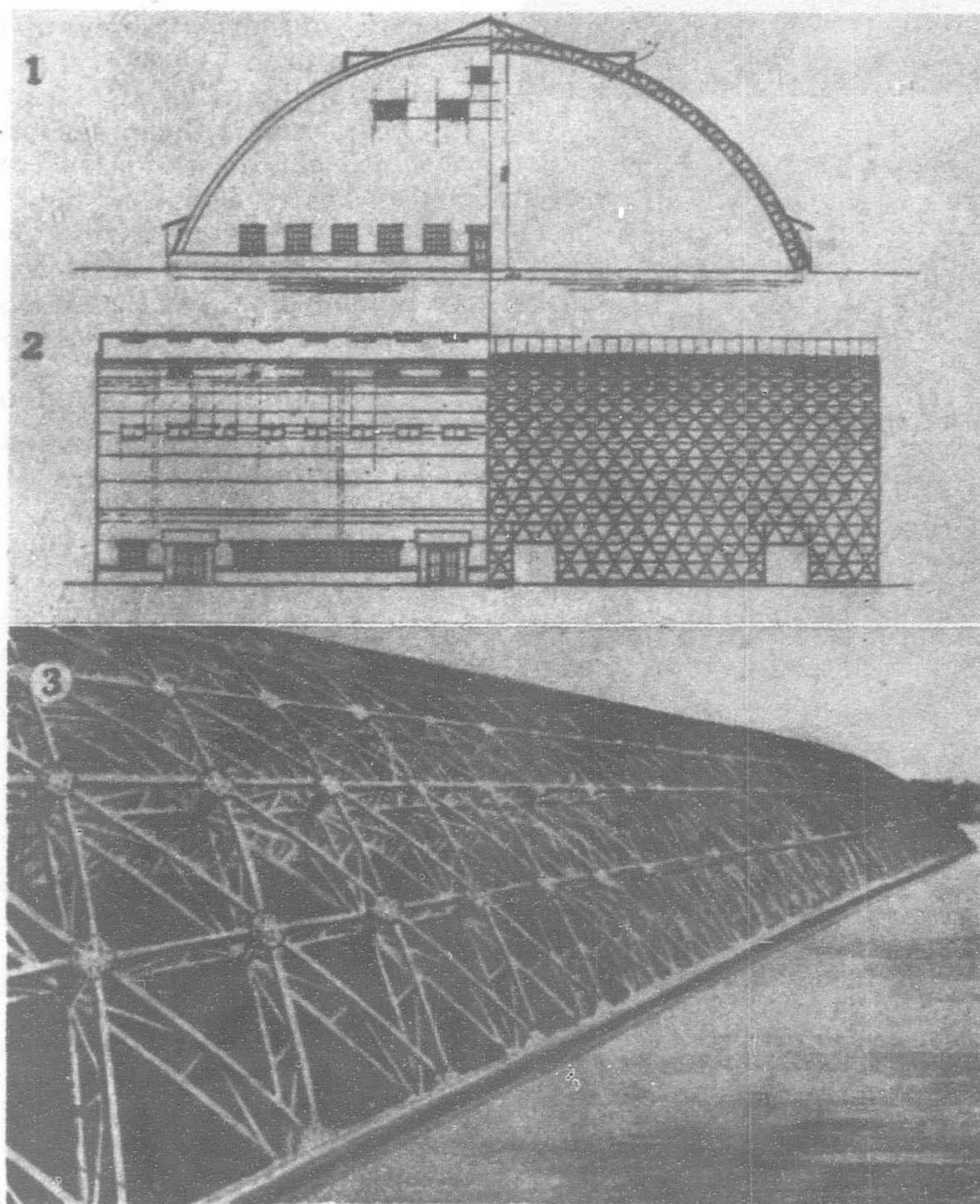
Characteristic Features

1. As the shape of the Diamond Truss is an arch, the equation of which is approximately parabolic, it renders it feasible to account for economy in the building material (when the span is 35 meters, the economy in material reaches 40 per cent, and when the span is 45 meters, the economy reaches more than 50 per cent).

(2) Because the erection of the Diamond Truss is accomplished without the use of false-works, the construction is simple and speedy (There is a precedence of constructing a Diamond Truss structure of 40 meters by 60 meters within three days and a half).

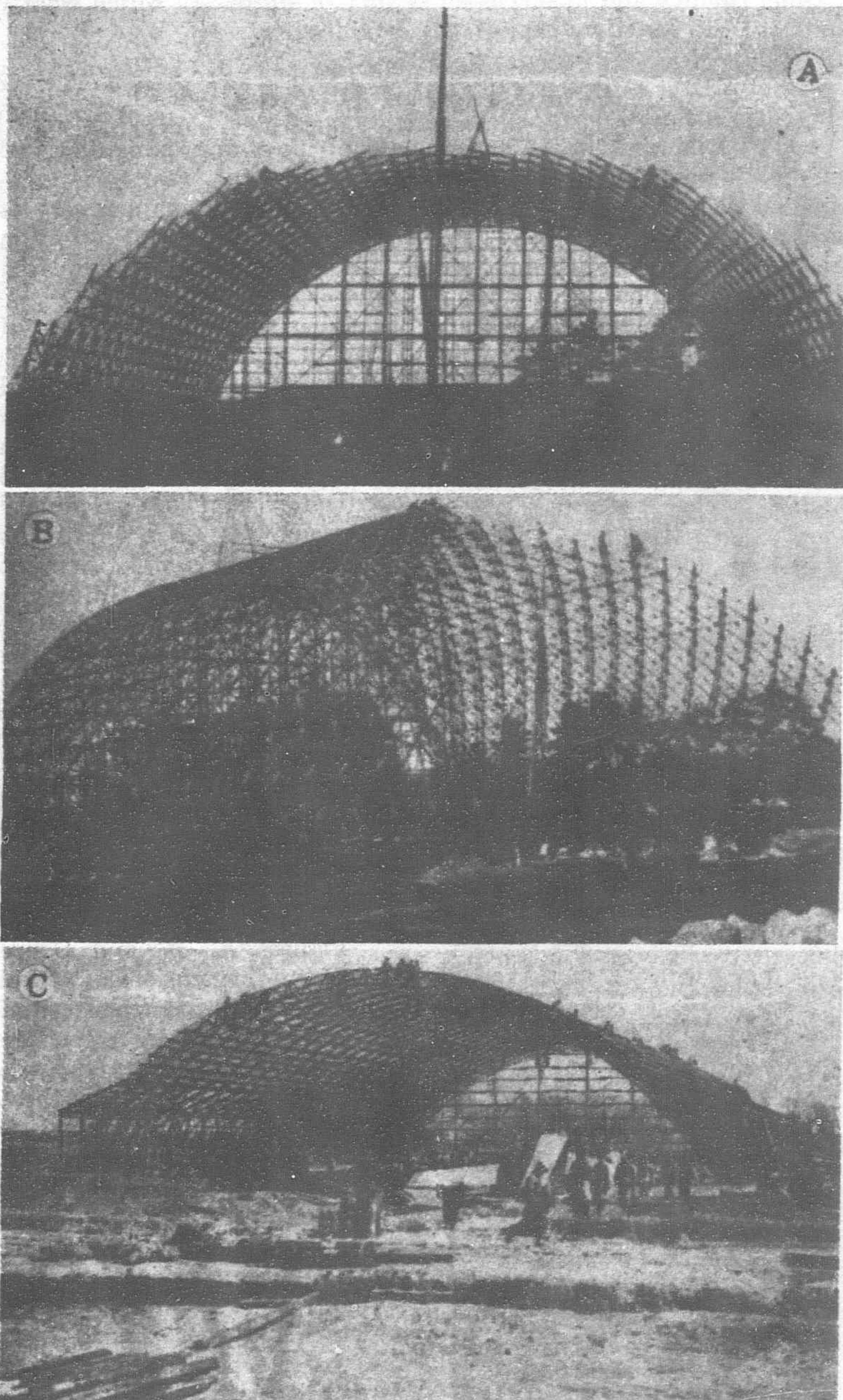
(3) That the unit of the truss is uniform in shape renders it easy and speedy in the production process.

* From the Osaka Mainichi.



Figures 1, 2 and 3, showing the end elevation and section; the side elevation and transverse section; and the structural units and the method of joining them with the use of flat spikes and rivets

- (4) Since the structure is composed of triangles, it is particularly strong in its resistance to twisting force.
- (5) As no columns are necessary, irrespective of the scope of the span, the composition is peerless in the way of accommodating space.
- (6) All of the foregoing factors contribute to the reduction in the cost of construction.



Figures A, B, and C offer interesting illustrations of actual buildings under construction, and show how the structures are self-supporting without the use of false-works

Construction Work in Mukden

(Continued from page 238)

A striking increase in road construction outside of Mukden, which jumped last year to 20,700,000 yuan from 2,900,000 yuan in 1936, can be noticed from the above table. Private construction, under which classification work done for the Manchuria Air Transport Company, Manchuria Electric Company, Manchuria Telephone and Telegraph Company, West Industrial District and other big concerns are included, has also registered a large rise of more than 240,000 yuan in earthwork and road construction and more than 5,140,000 yuan in building construction.

While this year's construction work is expected to be bigger than last year, local contractors are facing considerable difficulties in the supply and cost of materials and labor. The cost of labor usually increases with the beginning of the construction season and decreases from October, when construction is nearing its end. Last year's wages, which were expected to be lower towards autumn remained however on the same level on account of a general rise

in prices for flour, kaoliang, millet, rice and other necessities, and were on the average as follows: coolies 0.70 yuan per day, scaffold workers—1.30, diggers—0.80, masons—1.60, bricklayers—1.50, plasterers—1.60, carpenters—1.50, glaziers—1.50, tin-smiths—1.50, horse cart—2.50, motor truck—22.00.

Labor Shortage

A shortage in labor is contemplated this season for though 500,000 seasonal laborers are to be permitted to enter this country from China this year, or about 120,000 more than during last year, it is doubtful whether the expected number will come to Manchuria as there will be a great demand for labor in North China in connection with large scale construction work there.

The price of iron and steel, which are now under government control have been on a constant upward trend, and difficulties experienced in the iron and steel supply for work other than that connected with heavy industries, might result in a postponement of some of this work or even in its cancellation.

Last season the price of iron angles and iron belts increased from 22 yuan to 30 yuan per 100 kilograms, iron plates from 25 yuan to 37 yuan and joints from 25 to 35 yuan per 100 kilograms. The price of zinc plates went up from 1.25 to 1.45 per piece, galvanized roofing from 1.00 to 1.50 per piece, glass from 8.80 to 10.80 per case and high quality glass from 25.00 to 29.00 per case. The cost of bricks, cement, lime, nails and other locally produced materials remained almost stationary last year. Though the price of local lumber has registered a slight increase, that of lumber imported from abroad went up by ten, twenty and even, in some cases, forty per cent. However, the aforementioned difficulties cannot retard the present progress of construction which is expected to be in full swing, for at least two or three years more.

List of Works

The list of work contracted for at Mukden in 1937 and 1936, which was compiled by the Mukden branch of the Contractors' Association, is given below:

Buildings		Total	
No.	Cost in Y.	No.	Cost in Y.
14	965,020	14	965,020
6	253,000	6	253,000
275	2,456,193	674	3,823,264
252	2,252,256	519	3,251,042
80	1,462,075	109	1,869,599
100	2,490,857	150	2,919,667
2	44,970	2	44,970
—	—	—	—
495	10,232,522	609	10,295,515
573	15,379,494	609	15,685,229
866	15,160,780	1,305	16,998,357
931	20,375,797	1,293	22,109,138
93	6,480,699	170	9,429,067
77	4,564,425	229	25,331,918
—	—	—	—
959	21,641,479	514	26,427,433
1,008	24,940,222	1,522	47,441,056

Japan's Progress in Electric Power

(Continued from page 237)

CONSUMPTION OF ELECTRIC POWER IN INDUSTRIES, 1936			
	Supplied by public utilities kw.h.	Supplied by private plants kw.h.	Total kw.h.
Weaving	714,901,689	68,122,403	783,024,092
Spinning	7,371,124	120,846	7,491,970
Rayon	159,801,369	412,907,756	572,709,125
Woollen goods	103,951,743	2,708,005	106,659,748
Paper manufacturing	361,261,660	283,583,658	644,845,318
Artificial fertilizers	1,618,100,188	151,866,365	1,769,966,553
Industrial chemicals	161,515,533	296,783,289	458,298,822
Soap and toilet articles	4,231,841	914,188	5,146,029
Other ordinary chemicals	68,976,612	9,911,209	78,887,821
Sugar refining	8,038,701	5,229,953	13,268,654
Beer brewing	29,079,106	1,622	29,080,728
Flour production	47,036,548	5,832	47,042,380
Confectionery	6,377,187	—	6,377,187
Steel	379,211,434	461,004,425	840,215,859
Copper	111,726,891	5,786,969	117,513,860
Electric appliances	59,822,970	—	59,822,970
Machines and tools	145,085,795	5,152,636	150,238,431
Shipbuilding and rolling stock	157,938,879	—	157,938,879
Coal mining	361,943,792	491,761,661	853,705,453
Petroleum	31,216,384	11,320,851	42,537,235
Cement	50,137,569	445,112,869	495,250,438
Printing	7,409,179	40,200	7,449,379
Total	4,595,136,194	2,652,334,737	7,247,470,931

NOTE:—These figures represent kilowatt-hours consumed by large companies respectively.

A New Customs House for Manila

ONE of the most important projects under Commonwealth supervision at present is the new Manila Customs House in the Port Area district, according to Vicente Fragante, director of Public Works. The cost of the new building will be about P.1,200,000. Bids for its construction were opened on May 19.

The site of the Manila Customs House was filled-in some fifteen years ago by the Bureau of Public Works, and its cost is not included in the construction estimates. Pile driving under the supervision of Manuel Intengas, superintendent of Piers and Wharfs, should be completed in about ninety days. A Cummins-diesel 55 h.p. engine is now in use by the Bureau of Public Works in the foundation of the Customs House which has a two-ton drop and is fast and flexible. The machine is now driving approximately forty-five piles per day and does its own moving and picking up of piles. A steam pile driver is also working on the property and it is interesting to note that the diesel-powered pile driver is much faster and more flexible than the steam. Distributors for the Cummins-Diesels in the Philippines is C. M. Lovsted & Co. From 4,000 to 5,000 piles will be driven.

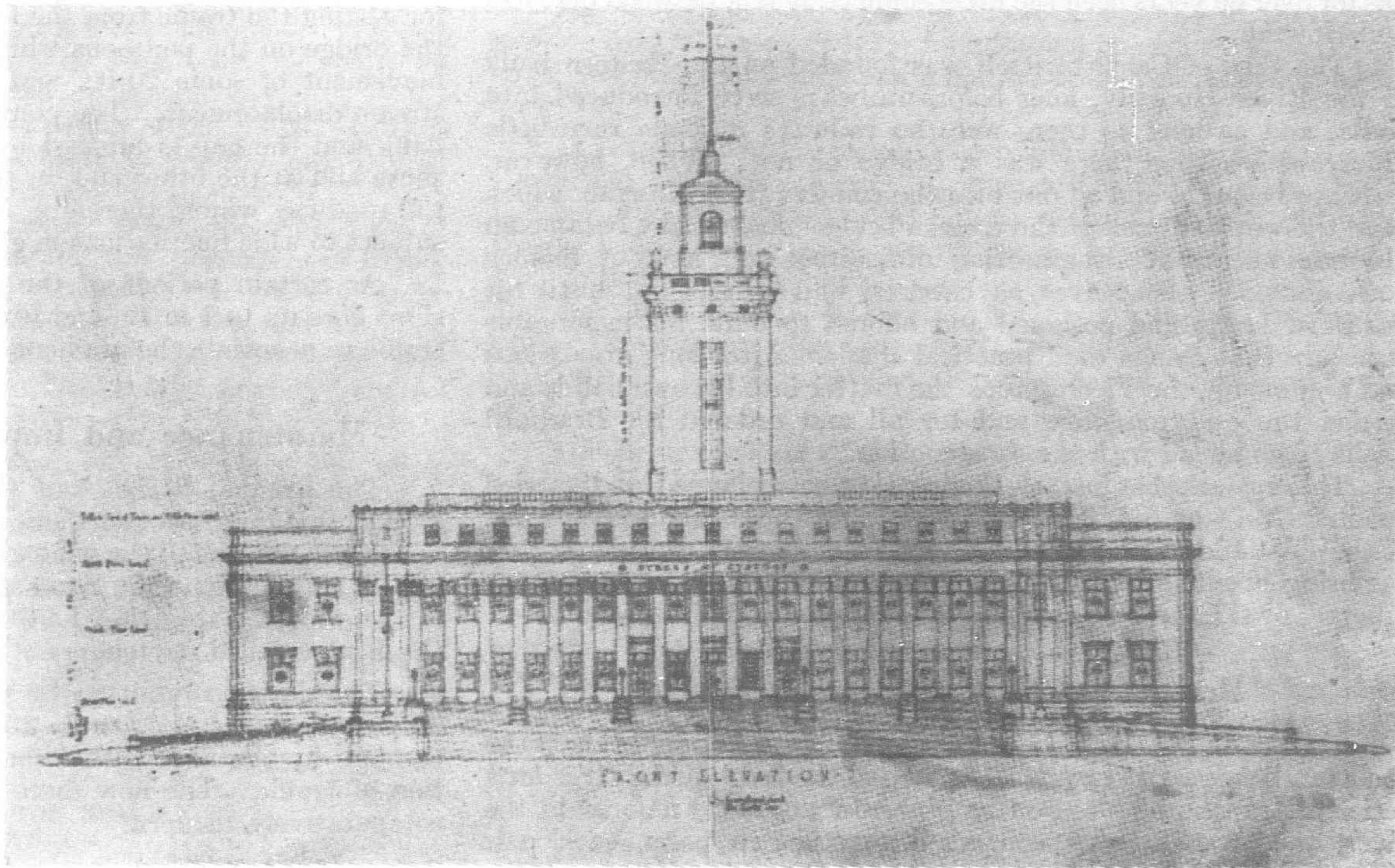
Built of reinforced concrete with a structural steel tower, the New Manila Customs House will be an impressive building. On the ground floor, space is reserved for Examination Rooms, Chinese baggage and Auction Sales department. The main floor will be tiled and the floors and walls of the lobby will be finished in marble. On the floor will be the vaults, and Accounting rooms, the Appraisers Cashiers, and Marine Departments. The third floor which will be built around an open court will be used by the Superintendent

of Navigation, Chairman and Secretary of the Tariff Commission, with a Session Room, the Harbor Board, Collector of Customs, his Deputy, and an engine room.

The fourth floor will be occupied by the Secret Service Department, Police, Guards, Watchmen, Customs Agents, and Surveyors, and will be built about the open court.

In the tower, which is forty-three meters high, the office of the Superintendent of Customs, a restroom for Messengers, a Semaphore Station, Machine and Control Room and the Typhoon Signal Service will be installed.

A two story building will be constructed just back of the main building and will be used as a garage, store house for Customs and Harbor Board and for Quartermaster and Property Supplies.



A drawing of the new Manila Customs House, to be built in the Port Area district

Manila North Harbor Construction

AMONG important government projects to be started shortly is the Manila North Harbor for which an appropriation of P.2,500,000 was made by the National Assembly, according to Vicente Fragante, director of Public Works. Final plans are now being made by the Public Works officials before actual construction starts. The Manila North Harbor will, according to Director Fragante, be constructed on a reclaimed area between the mouth of the Pasig River and the Estero de Bitas, Tondo. It will have an area of about 100 hectares 600 meters wide and 1,400 meters long.

Alejandro J. Villanueva, port works engineer, estimates the work will take about three years to finish. About forty men will be employed daily on the project as much of the construction will be handled mechanically. A new Cummins-diesel powered pile driver and a good concrete mixer has been purchased by the Bureau to handle much of the work. A sea wall will first be built around the reclaimed area; it will then be filled in and the foundations of a strong wharf laid down.

Mr. Fragante will confer with officials of the Customs, representatives of the Pilot Association and of the Philippine

Interisland Shipping Association on important matters pertaining to the new wharf.

The project will eliminate many of the Pasig River traffic problems. It is reported that a Customs official said that the entrance of coastwise vessels into the Pasig will be prohibited when the Manila North Harbor is finished. All coastwise vessels will be asked to berth along the new wharf.

The government will thus assist in improving navigation for coastwise shipping as the Pasig River is considered too small and narrow to afford safe navigation for the volume of shipping at present. It was pointed out that the size of coastwise vessels has been enlarged recently, which further hinders shipping.

Mr. Villanueva said that the Bureau of Public Works is improving other wharves in Philippine ports. The surface of the Calapan, Mindoro, wharf is being increased with a P.30,000 appropriation. Zamboanga is extending its pier with the P.60,000 appropriated for that purpose. The Cagayan River is being controlled by a wall to provide more berthing space for vessels going to the port of Aparri, for which an outlay of P.300,000 has been set aside.

Calcutta's Howrah Bridge*

Acknowledgment is made to Messrs. Rendel, Palmer & Tritton, Consulting Engineers, London, for the details of the new Bridge, Mr. J. Hodgkinson, Manager of the Craven Indian Office, for the interesting details concerning the old structure, and the Statesman of Calcutta, for the very interesting photographs used to illustrate this article, also Mr. C. Roberts of that Journal for his valuable assistance.

* * *

CONSTRUCTION work on the foundations of the New Howrah Bridge began last Spring. When the time comes for it to be opened and the old bridge dismantled, the citizens of Calcutta will look back on the present Howrah Bridge with a certain amount of affectionate tolerance, and will no doubt boast to their children of remembering this unique structure which has for over 60 years been the main connecting link between Calcutta and Howrah.

The City of Calcutta itself was founded on the Eastern bank of the River Hooghly, long before railways were introduced into India, and as long as there were no railways it made very little difference whether there was a bridge or not. When, however, railways began to spread out into the country from Howrah, which is on the western bank of the river, a bridge of some sort became an absolute necessity. Engineering difficulties and lack of finance both obtruded themselves as barriers, and it was not until Sir Bradford Leslie had designed and offered to build his memorable structure that things took practical shape. After long discussions and arguments, the Viceroy took the matter into his own hands and settled the question once and for all and ordered Sir Bradford Leslie to go ahead with the construction.

This remarkable feat of Engineering was planned and carried out in 1873-74 by Sir Bradford Leslie (afterwards Engineer-in-Chief of the East Indian Railway). At that time it was considered that the bridge would never stand the test of a violent storm or a strong "bore" or tidal waves, or resist the freshets down the river.

Design and Cost of Pontoon Bridge

Sir Bradford Leslie's design was for a pontoon bridge, the roadway being carried some 20-ft. above the level of the river on a series of trestles mounted on long narrow pontoons moored in the river, the trestles being connected together in pairs, each pair carrying about 100-ft. of roadway, the abutting sections of the roadway being joined up to each other by heavy pins. This resulted in a very flexible roadway easily accommodating itself to the movements of the pontoons.

Chain cables extend up and down stream from the ends of the pontoon and are attached to anchors deeply embedded in the mud. Sufficient slack is of course necessary on the cables to allow for the rise and fall of the tide which amounts to over 20-ft.

As a result of this slack, and under the influence of the tide flowing up and down the river, it is an interesting fact that the whole structure of the bridge bends like a bow and has in the center a range of movements of approximately 12-ft. This seems a large figure but is almost unnoticeable to the casual observer.

When this bridge was built it was only to last 25 years, as it was a temporary expedient and apparently then, as now, 25 years was regarded as the usual "life" unit.

The Bridge, however, has stood the test of time and its condition now is as sound as ever. It is the largest pontoon bridge in the world and cost £220,000 only to build.

Traffic over Bridge

The traffic over the bridge was, at first, light, but as time advanced it grew denser and denser until it was necessary to replace the original timber substructure between the roadway and the pontoons by steel. The census figures show that at the present time a much greater volume of traffic crosses this old bridge every 24 hours than that which crosses the famous London Bridge.

An interesting feature of the old bridge is the method adopted for getting the traffic from the fixed shore abutments to the deck of the bridge on the pontoons which, it will be recalled, has a vertical movement of some 20-ft., and also a considerable up and down stream displacement. The pontoons stop about 100-ft. from either bank and the gap is bridged by girders resting at one end on the shore and at the other end on the pontoons. These girders support the roadway which, therefore, for the first 100-ft. of the bridge, is subject to wide fluctuations in gradient.

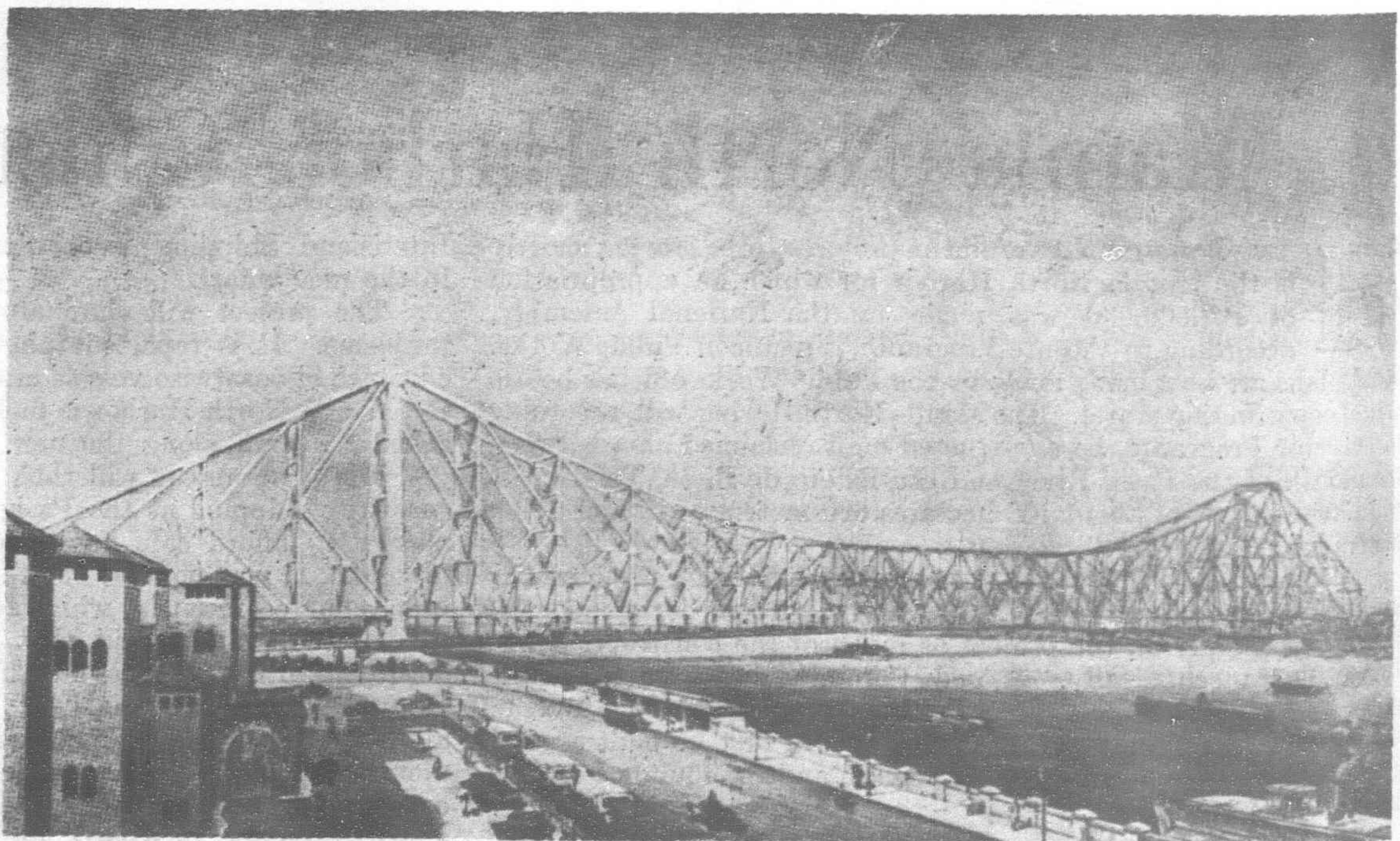
At certain periods of the year when the tides are high, the slope goes up to 1 in 13, and it is almost impossible for bullock cart traffic to negotiate the gradient.

Maintenance and Improvement of Old Bridge

The original design had three 160-ft. main girders on each bank, providing between them two narrow lanes about 20-ft. wide which had to take all the vehicular traffic, while on the outsides were two narrow footpaths. Some eight years ago, these spans had so far deteriorated that they had to be replaced and the Custodians of the Bridge called for tenders.

The design submitted by one of the local Engineering firms, Messrs. Jessop & Co., was accepted and the work was carried through by the firm with complete success and with no dislocation of traffic. The new shore spans now in place are, therefore, comparatively modern.

* From Craven Machine Tool Gazette.



The New Howrah Bridge—Reproduced from drawing

Opportunity was taken when preparing the scheme of replacement to eliminate the center girders, leaving the roadway in one clear stretch 42-ft. wide. The width of the foot-paths were also doubled with great advantage to traffic. The operation of building the new spans into place and of removing the old ones without in any way disorganizing heavy traffic, was a most tricky and dangerous one, the whole process being completed by the fact that not for one minute, day or night, was the bridge at rest.

Irregular tidal movements both up and down stream as well as vertically, had to be accommodated without interfering with the accurate placement and attachment of the new steelwork, or with the piecemeal removal of the old structure.

It speaks volumes for the technical organization and design, as well as for the wholehearted and efficient co-operation of the permanent bridge staff and of the police, that this very vital operation was so successfully performed on the old bridge.

Sir Bradford Leslie was well known for the ingenuity of his designing, and nowhere did the fertility of his Engineering resources manifest itself more clearly than in the mechanism attendant on the opening of the bridge to allow passage for river traffic too large to pass below the various openings between the pontoons. For this purpose, two center groups of pontoons, each carrying 100-ft. of roadway, were arranged to be floated up stream and then swung respectively East and West so as to lie clear of the 200-ft. gap thus formed in the roadway. Before these sections could be manoeuvred upstream, it was necessary to form a gap of about 20-ft. on each side of the roadway to be moved in order to provide the necessary floating clearance. The mechanism for this purpose was highly ingenious, the motive power being provided by a series of three balanced water-tanks, one working inside the other, and a system of levers and chains. The addition of water and the subsequent drainage of the tanks gave the necessary floating control movements.

About four years ago it was necessary to replace the whole of the center 400-ft. of the bridge. Four spare pontoons were reconditioned and on them, in pairs, entirely new sections of roadway 100-ft. long were built. These were substituted for the old sections between midnight and dawn so that traffic was not much impeded. After about six months the process was repeated and the remaining 200-ft. of roadway similarly changed. The necessary opening flaps in the new section were arranged to operate rapidly by means of an electric motor.

Design, Dimensions and Cost

The construction of a new bridge has been the subject for much debate and argument, for the last 25 years. The cost of the bridge

and the difficulties arising due to the irregularities of the river, have been the cause of the delay in constructing this new bridge. The River Hooghly is perhaps one of the most fickle rivers in the world and serious consideration had to be given to the fact that the deep water channel in the river alters its course in a sort of diagonal pattern all the way along the river, moving from one bank to the other, in its course. Where the jetties of the Calcutta wharf are situated, the deep water channel comes right along the bank, although it is necessary to keep three dredgers working on the river to prevent silting at the jetties.

The new bridge is being built within half a mile of these jetties and during the discussions as to the type of bridge to be built, a very important question was raised as to whether piers in the river would have a tendency to alter the course of the deep water channel due to scouring and silting.

At the time this was not considered to be very important, but there was always prevalent the risk that piers might alter deep water channels and cause Calcutta Jetties to become moribund.

The final selection was, therefore, a bridge of the single-span cantilever type, with its foundations on either bank of the river, and sited approximately 650-ft. from the existing bridge upstream.

The New Bridge is being built to the design prepared by the Consulting Engineers, Rendel, Palmer & Tritton, of Westminster, London, who are also acting as Engineers for the Works, Mr. A. M. Ward, M.INST., C.E., being the Engineer to the Commissioners. The Contractor responsible for the construction of the bridge is The Cleveland Bridge & Engineering Co., Ltd., of Darlington, whilst the sub-contractor for the fabrication of the steel superstructure is The Braithwaite, Burn & Jessop Construction Co., Ltd., of Calcutta.

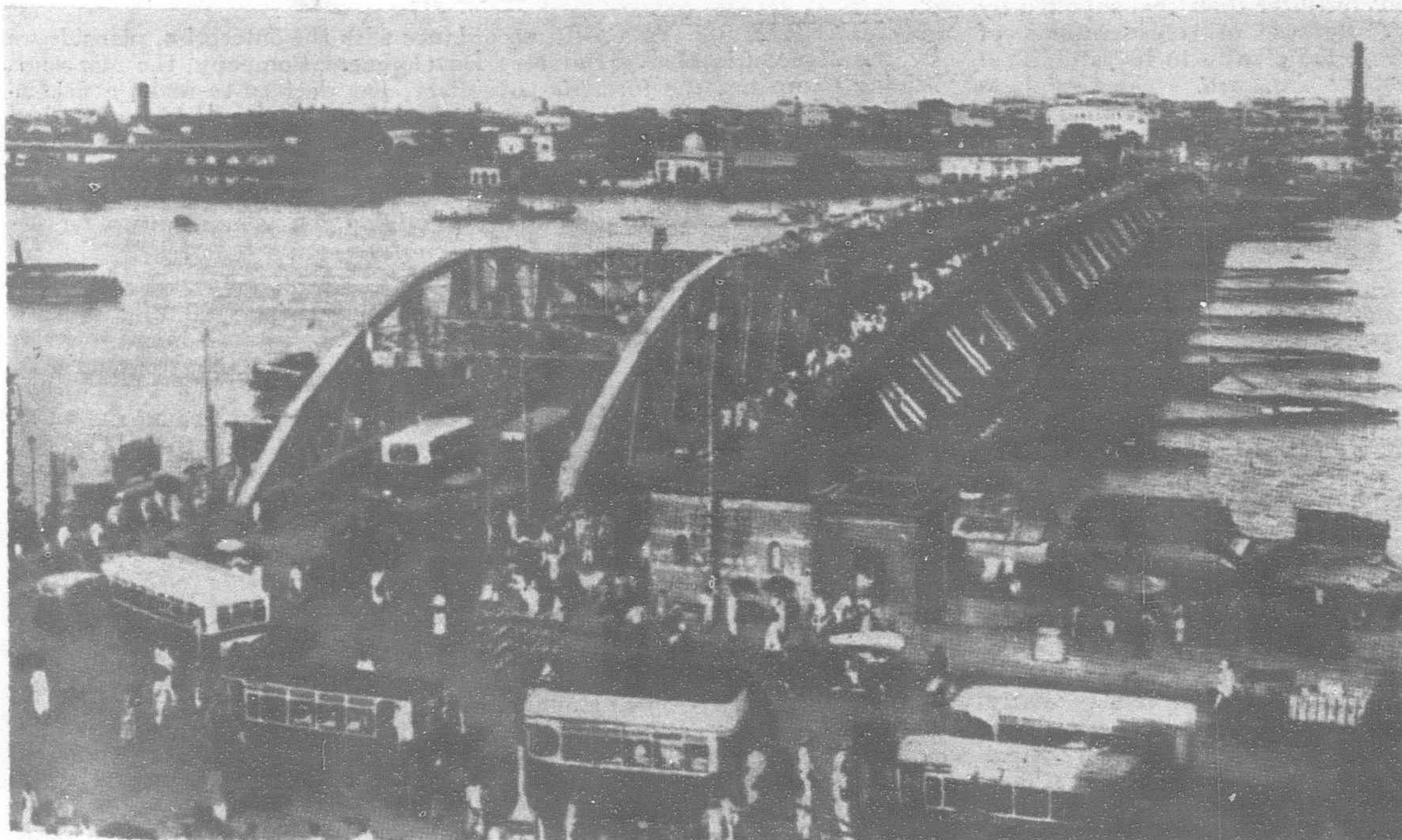
The Bridge will be of the Cantilever type with a main span of 1,500-ft. centers of towers, which is made up of a central suspended span 564-ft. long and two cantilever arms each 468-ft. long. It will be the longest-span highway Cantilever Bridge in the world, there being only two longer span Cantilever Bridges, namely, the Forth Bridge and the Quebec Bridge, both of which are railway bridges. The anchor arms will each have a length of 325-ft. and the towers will rise to a height of approximately 270-ft. above road level. The Bridge will carry a road of 71-ft. clear width between curbs and will accommodate eight lanes of vehicular traffic, including two tramway tracks running along the center of the roadway.

Pedestrians will be accommodated by two 15-ft. wide foot-paths which will be carried on cantilever brackets on each side of the bridge.

Each main tower will be supported by a single monolithic pier of cellular construction, which will be founded in a stratum of stiff clay underlying the alluvial deposits which form the upper strata on both sides of the river.

The superstructure will be fabricated mostly in high tensile steel, mild steel being used only where it would be uneconomical to use high tensile steel. The bridge will contain approximately 27,000 tons of steel.

The floor system of the bridge will be suspended below the main structure so as to permit the approach roads leading on to the bridge to pass underneath the main girders of the anchor arms. It is estimated that the new bridge will take four years to build at an estimated cost, excluding approaches, of approximately £1,600,000.



The old Howrah Bridge looking from the West Bank

Engineering Notes

INDUSTRIAL

OIL COMPANY PLANNED.—Keeping pace with the current situation in North China, where petroleum enterprises are to be controlled by the Provisional Government of the Chinese Republic, it was decided to establish the North China Petroleum Company, capitalized at 20 million yuan subscribed to by the Nippon Sekiyu Kaisha, Kokura Petroleum Company, the Mitsubishi Petroleum Company, the Aikoku Sekiyu Kaisha, the Asaki Petroleum Co., the Manchuria Petroleum Co., and the Chosen Petroleum Co.

TO BOOST IRON OUTPUT.—A plan for increasing iron production is under way by the Penhsihu Iron Works in compliance with the drastic revision of the five-year industrial development plan of Manchoukuo, the *Manshu Nichinichi Shimbun* reports. According to this plan, the *Manshu Nichinichi* says, iron ore output is expected to reach 6,000 tons daily in 1941 with an increase in mining at Nankung and Miaoerhkou mines and with the exploitation of Papanling and Tungyuanpo mines on the Mukden-Antung line, as compared with the present daily 700 ton production.

FLOUR MILLING.—With revival of peace and order in North China, the Nitto Flour Mill Company, the Nippon Flour Mill Company and the Nisshin Flour Mill Company are active in North China, purchasing or jointly managing with the Chinese owners the flour mills which had suspended their operations on account of damage done to the mills since the start of the Sino-Japanese hostilities. The Nitto Flour Mill Company is principally active in Shansi Province and along the Peking-Hankow line and the Nisshin Flour Mill Company and the Nippon Flour Mill Company in Tientsin, Peking and Tsinan.

TOBACCO PLANTING.—Since import restrictions of the Finance Ministry have hit its own Monopoly Bureau, the Bureau plans to get tobacco seeds from abroad to grow more foreign varieties of tobacco in Japan, according to the *Asahi*. If the measure is successful, it is expected to have far-reaching effects in the operation of the tobacco monopoly. Formerly the bureau customarily bought from Y.6,000,000 to Y.10,000,000 worth of tobacco leaves from America, Turkey and the Philippines to blend with local products in making Kohaku, Hope, Cherry, Hikari and Golden Bat brands of cigarets.

SPECIAL STEEL MAKING.—In expectation of a marked increase in the demand for special steel with the rapid development now being witnessed in the heavy industries in Manchuria, applications are expected to be presented to the Manchoukuo Department of Industry for the approval of special steel manufacturing plans by the South Manchuria Railway Company, which has already started production of this hard metal at the Fushun provisional iron manufacturing laboratory, and by the Sumitomo Metallic Industry Co., the Okura Mining Co., the Showa Steel Works, the Manchuria Steel Works, and the Tahwa Electric Metallurgical Company.

FERTILIZER PLANT.—The Manchuria Chemical Industry Company which has sent a technical research party headed by Mr. Shoichiro Hori to North China, is reported to be planning to establish a sulphate of ammonia corporation there. According to tentative plans the Manchuria Chemical Industry Company is to produce nitrogenous fertilizer from coal supplied by the South Manchuria Railway Company. Because of considerations of facilities and supply of raw materials, the projected plant is to be established along the Shanhaikwan-Peking line. At first the plant will produce sulphate of ammonia and then manufacture nitrogeous, and phosphatic fertilizer.

SEEK COTTON SUBSTITUTE.—In facing the unprecedented shortage of cotton under Government control, the Nishijin Silk Weavers' Association, Kyoto, decided that its members would use a staple fiber mixture in place of cotton, if the phenomenal dearth continues. The Nishijin weavers purchase some 900,000 kilograms of cotton for weaving Nishijin-ori annually, but the recent supply of cotton by the Government does not fill even half the needed amount. This has forced them to seek another substitute; hence the adoption of staple fiber in place of cotton.

It is said, however, that the Nishijin silk interwoven with staple fiber is somewhat flexible when it is made, for instance, into "obi." The Nishijin Silk Weavers' Association, therefore, is doing its best to seek another perfect substitute.

SHOWA TO ENLARGE OUTPUT.—Faced with the urgent necessity of expanding production beyond that provided under its fourth plan for increasing iron and steel output, the Showa Steel Works, through its president, Mr. Naoto Kobiyama, now in Tokyo, has reached an agreement with the Japanese Government whereby it is to launch its fifth production augmentation plan immediately to run simultaneously with the fourth plan. Final research as to iron resources in the Tungpientao District will be made early this spring to develop the mines in that district. A suitable area for a new iron works will be selected after research is completed. The Showa Steel Works will enlarge its mills to accomplish the plan for increasing the iron and steel output. A large outlay required for the fifth plan, in addition to some 40 million yen needed this year to carry out the fourth plan, will be raised by the Manchuria Heavy Industry Development Company hereafter, instead of borrowing from the banking syndicate as in the past.

RAILWAYS

GAS-DRIVEN TRAINS.—Japanese-made locomotives, which are driven by gasoline, have completed successful trial runs on the Shanghai Nanking Railway, according to Japanese Press reports, which add that trains pulled by the new locomotives reached Nanking in seven hours, while ordinary locomotives burning coal need 12 hours for this run.

NEW ROLLING STOCK.—According to the *Asahi Shimbun* (Tokyo), the Japanese Ministry of Railways is planning the construction of 500 locomotives, 1,000 passenger coaches and 10,000 freight-cars to meet needs in Manchuria and North China, both for peace and war. The total cost will be Y.70,000,000.

SHIPPING

NEW VESSEL PLANNED.—With a view to relieving the congestion of passenger traffic now prevailing between Chosen and North China via Dairen on account of a shortage of bottoms, the Awa Kyodo Kisen Kaisha placed an order of late with the Tama Dockyard to construct a vessel which is to be placed on the Chemulpo-Dairen-Tientsin line from fall next year.

SHIPPING FIRMS FOR CHINA.—Although Japanese Government officials are still carefully considering the organization of a shipping company to ply the North China coast, general movements so far on the part of Government authorities indicate that a Y.100,000,000 shipping company will be organized in Kobe shortly, centered around the Nisshin Steamship Company and including the O.S.K., the N.Y.K. and the Dairen Steamship Companies. In carrying out this gigantic plan, ships at present sailing the coastal routes will be modernized and speeded up, while new ships will also be added.

N.Y.K. TO BUILD LINERS.—Three liners of about the same size as the *Asama Maru* will be constructed by the N.Y.K. to accommodate passengers visiting Japan for the 12th Olympics in 1940. Construction work on one will commence in May at the Mitsubishi Dockyard in Nagasaki. The projected liners will each weigh 16,500 tons and will have a speed of 22 knots an hour, with 21,000 h.p. engines. Compared with the *Asama Maru*, the largest liner of the N.Y.K., the new vessels will be less by 500 tons in tonnage, but faster by more than one knot, as the engines of the former generate only 16,000 h.p.

MINING

MITSUMI DEVELOPMENT.—Faced with the urgent necessity of developing the Mozan iron mines in Chosen under the present situation in which rapid completion of the plan for increasing iron and steel production is imperative in both Japan and Manchoukuo, the Mitsui Mining Company, which has drawn up a plan for the development of the Mozan iron mines development on a large scale, is entering into a contract with the Manchuria Coal Mining Company to purchase from the latter a large amount of Mishan coal for iron manufacturing purposes.

MINERAL SURVEY.—In accordance with the enterprise, plans drawn by the Manchuria Heavy Industry Development Company, the Manchuria Mining Company, the former's subsidiary, has decided to make a field-investigation of mineral resources in South Manchuria such as gold, copper, lead and zinc. The research party, comprising several groups, will be sent to the Tungpientao District and Jehol Province, in which the company has established three sub-branches at Tunghua, Mukden and Jehol. The company is reported to have appropriated several million yen as expenditure for conducting the mineral survey.

CHUNG HSING COAL MINE.—The Chung Hsing Coal Mine, situated to the east of Chichung and about 32 kilometers east of Linfen, to which members of the China Development Company were sent to take over, was the best coal mine in Shantung Province. The mine was formerly controlled by the Chung Hsing Coal Mining Company of Shanghai, and its annual output of coal in recent years averaged 10,000,000 tons. The coal from this mine is bituminous, of good quality, but of less ingredients. All the machineries of the mine were operated by electricity that was generated from the mine's steam turbine generators. The mine was equipped with modern machineries and also with an insulated coke manufacturing plant.

PLAN MINING COMPANY.—An agreement has been reached in Tokyo on the establishment of a mining company under the control of the projected Central China Development Company, capitalized at 150 million yen, which is shortly to be inaugurated. The mining company, which will be established as soon as the Central China Development Company is formed is expected to mine iron ore in Central China, shipping its output to Japan because of the shortage of coal for iron industry use in that district. The projected North China Iron Works under the control of the North China Development Company, on the other hand, will not only mine iron ore, which will be exported to Japan, but will also refine the ore, for which furnaces will be built.